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Contributions.

Live Loads and the Hammer Blow.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Sept. 14, I noticed Mr. J. A. L. Waddell's letter on his proposed standard bridge loads. I wondered if in adopting a standard system, Waddell used the locomotive hammer blow as a factor of the assumed live load. It certainly should be considered in the panel live load. Did you ever note that the bridge seat coping in nearly all small bridges and in many large ones, is cracked under the wall plates, and the effect of the failure of the bridge seat tends to crack and destroy the masonry? It is a fact, and I have concluded that no bridge seat coping should be less than 24 inches thick. Some years ago I found some plate girder bridges of 50 or 60 feet span, I forget which, that had the girders blocked up on timbers which had become necessary on account of the tracks having been raised several inches. I considered this a shiftless job, and immediately ordered cast iron wall-plates, high enough to replace the timber blocking. At that time the masonry was in good condition. After the cast iron wall-plates were put in, the masonry immediately commenced to go; the bridge seats first, and the upper courses later, and in a short time it became necessary to rebuild much of the masonry. This is only one instance of many.

Assuming masonry first class and conforming to modern practice, what causes the trouble?

SUPERINTENDENT.

Long Rails on the Lehigh Valley.

Lehigh Valley Railroad Company,
SOUTH BETHLEHEM, PA., October 4, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am in receipt of your letter on the subject of 45-ft. length of rails.

The Lehigh Valley Railroad Co. laid about 2½ miles of these rails with mitre cut ends nearly four years ago, and during the past summer has adopted this length as standard. We have laid about ten miles in renewal of main track, and will continue to use them for all renewals. The weak points in the track, i. e., its joints and the cost thereof, are reduced just 33 per cent. as compared with a 30-ft rail. The length of 45-ft. was adopted for facility in renewals, two 45-ft. rails taking the place of three 30-ft. rails.

There is but one reason why a 60-ft. rail would not be better than a 45-ft. rail, and that is the large space left between the ends of the rails due to contraction in cold weather, but this objection might be overcome by cutting the ends more oblique. A 60-ft rail could be as readily transported as a 45-ft rail could be, but it would be heavier to handle in laying and especially objectionable in making renewals or repairs because the force of men employed ordinarily on a five-mile section could not handle the rails readily.

When renewals of rails are again necessary in our longer tunnels we propose using a 90-ft. rail.

ROBT. H. SAYRE,
2d Vice-President.

Rapid Transit in New York.

Under date of Oct. 1, Mr. William Barclay Parsons, Chief Engineer of the New York Rapid Transit Commissioners, submits a preliminary report of his observations in England and Paris, made during his very short visit there last summer. The report is intended merely to give, for the information of the Commissioners, the leading constructive features of several railroads, chiefly underground, which he saw on that visit.

He describes first the Metropolitan, Metropolitan District and the City South London, and gives drawings of characteristic cross sections of these constructions. The construction of both the Metropolitan lines was by the cut and cover method, even along the best streets, except where great depth necessitated tunneling. No attempt was made to give the stations a pleasing appearance, and "in fact, any such attempt would have been rendered ineffective by the engine smoke and the hideous advertising signs with which the station walls in England are covered." The platforms and stairways, however, have generous proportions. The minimum platform length is 300 feet, and width about 16 feet, and the stairways are generally 8 feet wide with an easy slope.

No attempt is made to get at a close estimate of the cost of construction, but it may be stated approximately that the ordinary two-track tunnel or covered way, cost for construction alone, exclusive of land, land damages, equipment and legal or other expenses, from £200,000 to £250,000 per mile; while expensive portions, as, for instance, the Cannon street line, cost for construction alone £400,000, and it is probable that, adding other items that mile cost not far from £1,000,000.

Mr. Parsons gives sketches and a short description of the method of constructing this part of the line. The street is but 49 feet from house to house, with a 30-foot roadway. A timber platform was laid across the street to carry the very heavy traffic. The rail level is considerably below the foundations, and the front walls of the houses were underpinned. Trenches were then sunk along the curb line, and enough earth removed from the center of the street beneath the platform to permit the roof arch to be turned, and then the remaining earth was removed and an invert laid, and finally the street surface was restored.

The City South London Railway we do not need to describe, that being doubtless well known to our readers. In the year ending June 30, 1894, this enterprise carried 6,476,505 passengers, the uniform fare being two pence. The cost of the road averaged £267,000 per mile. Mr. Parsons found the temperature here from 67 to 68 degrees when it was 69 at the surface, showing that the air was changed often enough to prevent any great loss of heat. The electrical equipment of the road is briefly described.

The Blackwall tunnel, now building under the Thames, just east of Greenwich, is next described. This we have described shortly in the *Railroad Gazette*, p. 664, Sept. 28. It is a circular tube 24 feet, 3 inches in diameter in the clear, and is intended for vehicle traffic and foot passengers. It is 6,200 feet long, 1,735 feet being open cut and 1,382 cut and cover. The rest is a tube, constructed with a shield. The contract price for the whole work is £870,000, but it will probably cost a million sterling. The Waterloo & City Railway, which we have recently described with illustrations, is also described by Mr. Parsons.

He visited Glasgow and saw there the Glasgow City & District Railway, 2.4 miles long. Of this, one mile was built by tunneling, some of it at a depth of 100 feet. The rest was built by cut and cover and in open cut. This line was opened in 1886. It is double track, the general construction being a brick arch, with a clear span of 26 feet in rock, and 27 feet where side walls are used. The cut and cover portion of the work was the most interesting, the ground being wet sand and mud. Two rows of 6-inch sheet piles were driven to clear the external lines of the tunnel when built. The surface of the street was then raised and a safety arch of concrete was turned, the ends of which rested on the piling. The water could not be pumped without drawing sand, and a drain was constructed immediately above the rock, which gradually drained the sand, permitting the tunnel to be built beneath the arch and between the piles. A typical section of this tunnel is shown in the report. Where there was no rock for the bottom, a concrete invert was turned. Omitting the open cut portion the 1½ miles of heavy, city, underground work cost without equipment, £334,000 a mile, two-fifths of which represents land, right of way, and general expenses.

Later the Caledonian Railway built the Glasgow Central Railway, 6.4 miles long, double track, all in cut and cover, except some tunnels at the west end. Here some important work was done, especially under the busiest thoroughfare of the city. The ground being bad, it was decided to keep the railroad close to the surface, the top of the roof of the tunnel coming in places to within 12 inches of the street grade. This arrangement interfered with all the sewers crossing the street and the sewer system was constructed before building the railroad. Intercepting sewers were placed in adjacent streets, substantially parallel to the railroad, and then these sewers were passed beneath the railroad at convenient points. Sewers draining the houses were rebuilt in duplicate, one on each side of the street, connecting with the nearest cross sewers. The water and gas pipes were removed to either side of the street. Two types of cross section were employed where the cut and cover method was followed, one a brick arch and the other a flat roof with plate girders and jack arches. Excavation for the side walls was first made along the curb lines. Sheet piles were driven at first, but as the driving jarred the houses, sheathing only was used afterward. When the walls had been built for some distance a section of the roof would be laid between midnight Saturday and 5 o'clock Monday morning, in which time the contractors would tear up the roadway, lay the cross girders

and jack arches, and restore the pavement. The greatest number of girders thus placed in one Sunday was thirteen, corresponding to a distance of 34 feet. Then the material was removed from beneath, being lifted by a steam crane and dumped into carts. Some of the ground was so wet that it had to be drained in advance by a circular, iron-lined drain, 4 feet 6 inches in diameter, driven beneath the tunnel level. This lowered the level of the ground water from 12 feet below street grade to 18 or 19 feet. On this line there are twelve stations, three of them being completely covered and six partly covered. The covered stations have either iron roofs or brick arch roofs, and are generally 600 feet long, with two platforms, each 13 feet wide. This road will be operated by steam locomotives, it connecting directly with the surface lines. Openings above will be relied upon for ventilation, except where for a distance of 3,000 feet no opening can be had, and here a 20-foot ventilating fan will be erected. This work will cost about £300,000 per mile, without equipment.

The Glasgow District Subway is built for local traffic, is circular, 6½ miles long, with two tracks, and generally is at a considerable depth below the surface. Each track is in a separate tunnel. In soft ground the tunneling is done by a shield and lined with a cast iron tube. In other places the cut and cover method was employed. The surface of the street was removed sufficiently to permit a concrete arch to be laid, supported at the ends by 4-inch sheet piles, the sewer being rebuilt above. Then the ground was removed from under the arch, and the ground being wet, compressed air was used. A concrete invert was laid, then the walls and the center pier underpinning the roof between the two tunnels were built. There are fifteen stations, and the platforms are from 18 to 32 feet below the level of the street and without elevators. This road will be worked by cable running at 15 miles an hour. There will be no sidings, but where the rail level is at the least depth there will be an elevator for lifting the cars to the surface. When trains stop at night they will be left at various stations where they can be inspected, cleaned and repaired. In the case of a break-down, the following train will push the disabled one to the elevator. The construction of this was begun in 1891, and it will be finished during the coming year, at a cost of about £115,000 per mile for the construction.

The Glasgow Harbor Tunnel is a large three-tube tunnel, for vehicles and pedestrians. Access to the tubes at either end will be had by elevators, which are now being put in by the American Elevator Co., the steel frame work for them having been supplied by the Passaic Rolling Mill Co., of Paterson. This work is now nearly completed. Compressed air was used at 28 pounds, the men working four-hour shifts. The contract price per lineal yard for each tunnel was £80, including the iron.

The Liverpool Overhead Railway is described, but our readers are so familiar with this that we may omit any note of it, as well as of the Mersey Tunnel. It may be well enough, however, to state that this is the only tunnel or underground railroad where there is a complete system of mechanical ventilation. At the two stations, 1.2 miles apart, are ventilating fans, and there is a circular ventilating tunnel 7 feet in diameter, connected at intervals with the railroad tunnel. The fans draw the air from the tunnel, and fresh air passes down through the two stations. Fresh air is thus introduced where it is most needed. Access to these stations is had by elevators, of which there are three, each holding 100 people. There are also stairways and a subway which reaches to the surface on an incline of 1 in 9. To keep the tunnel dry requires pumps capable of handling about 10,000 gallons a minute, and the working of the elevators, pumps and ventilating plant is about 20 per cent. of the whole working expenses; which Mr. Parsons points out as a matter to keep in mind in considering deep tunnels. This tunnel, including land and equipment, cost about £500,000 a mile.

In Paris Mr. Parsons found a little railroad being built by the Orleans Railroad Co. It is an extension of the Chemin de fer de Sceaux. This extension is from the Place Denfort to the Gardens of the Luxembourg, and will be in operation probably by next January. This extension, which is double track, and is 6,240 feet long, is, Mr. Parsons thinks, the most important piece of underground construction in Europe, regarded as a model for that kind of work, and is the only case where an attempt has been made to make a really handsome structure. Here the gas and water mains and sewers were rebuilt, being placed in duplicate on each side of the street with cross connections at convenient places above or below the tunnel. The tunnel in general has stone walls and a stone arch. In a few places where head room was very limited, iron cross girders and brick arches are used. Steam locomotives will be used and mechanical ventilation has been introduced. Just outside the haunch of the main arch a small conduit has been built connecting with a fan at a station, and connecting at intervals with the tunnel and through this the foul air will be drawn out. Fresh air will be admitted at various points along the line, openings being made in the side walls and covered with small kiosks. The road has three stations, the two termini, and one intermediate station. The Luxembourg station is wholly underground, the rail level being down about 34 feet. The others are partly open. Photographs accompanying the report give some notion of the care which has been taken to get good design in general and in detail for these stations. The engineers have been successful in giving them an attractive appearance, and

they even went so far as to have the lining bricks made entirely of porcelain, at a cost of about \$120 per thousand at the works. They were not satisfied that enamelled bricks would be sufficiently durable for the walls and roofs of the stations. The approaches have been carefully designed for the convenience of the passengers. Two stairways are used, the one for exit being somewhat larger than the one for entrance. At the Place Denfert station, which is one of the termini, there will be elevators for baggage, and at the Luxemburg station elevators for both passengers and baggage. The lighting, the operation of the ventilating fan, and of the turn-table at one terminus will all be by electric power. This work will cost, including the rebuilding of the sewers, about \$1,500,000 a mile.

The French engineers stated as the result of their experience that it was advisable to keep the work as close to the surface as possible. Their difficulties and the expense increased in proportion to the depth. This point was also strongly brought out by the engineers in charge of the construction of the Blackwall Tunnel. At one place there, although the plans called for tunneling, the contractors preferred to take a less price and dig from the surface, even where the depth to be reached was 65 feet, and where the soil which had been removed had to be replaced.

Mr. Parsons arrives at a number of conclusions, in most of which most engineers will agree with him. First, an underground railroad operated by steam, even with the best mechanical ventilation, would be intolerable in New York. Second, a railroad with a steady, frequent service can be worked successfully and economically by electricity. Third, an underground railroad worked by electricity has a comfortable atmosphere, and in it great changes in temperature can be avoided. Fourth, the rail level should be kept close to the surface, as excavation from the surface is cheaper and safer than tunneling. Fifth, if, however, conditions demand, a deep tunnel can be constructed, in which the circular form is best. Sixth, an underground road can be so designed as to be attractive in appearance. Seventh, the work can be carried on through a busy street without endangering the houses, and without seriously impeding travel.

The North Sea and Baltic Canal.

It is now over five centuries since the first canal connecting the waters of the North Sea and the Baltic was commenced. Since that three others have been completed. The last, the North and East Seas Canal, as the Germans call it, is the first one having capacity for modern commercial vessels. It is generally referred to as a military canal, for it will have immense value for offense and defense. But it is also a part of that great system of German natural and artificial waterways, with an apparent minimum capacity for boats of 800 tons, as against 300 tons on the French canals, and 40 tons on the English canals, by the aid of which the German engineers hope to cheapen transportation and reduce the cost of production in their country. As a matter of fact, the commercial advantages of the canal have always been urged, and it is expected that the tolls received will pay a fair interest on the cost of the canal, as well as increase the trade of the Baltic ports.

The canal runs from the mouth of the Elbe across Schleswig-Holstein to Kiel, the great German naval station on the Bay of Kid, at the west end of the Baltic Sea, and saves the long voyage through the stormy waters north of Denmark. It will shorten the distance to be sailed by vessels entering or leaving the Baltic by varying amounts. Between Leith, the port of Edinburgh, and a normal port in the Baltic, the distance saved will be approximately 85 nautical miles; for Hamburg the saving will be 425 miles. It was estimated when the canal was commenced that in 1895 the traffic through the channels between Denmark and Norway and Sweden would amount to over 18,000,000 tons, and that 60 per cent. of this, or 11,000,000 tons, would, on account of the saving of distance and the danger of the longer route, take the canal. The route around Denmark involves pilotage, and as some 200 vessels are said to be wrecked annually with a loss of \$2,000,000, it also involves higher insurance than by the canal.

The canal, which was begun in June, 1887, was officially opened on the 29th of last month. It commences at Holtenau, in the Harbor of Kiel, and goes via Rendsburg 61.31 miles to Brunsbüttel, at the mouth of the river Elbe, where there is a roadstead with about 4½ square miles, on which there is an average depth of 36 feet. Although it is a sea level canal, it has locks at each end. At the Baltic end, where the action of the tide is not to be provided for, the locks will stand open through a change of level amounting to about 3½ feet. When the variation is greater than this the gates will be shut; this is expected for about twenty-five days in each year. At Brunsbüttel regular tidal locks are built, but the gates will stand open for three or four hours on each tide. Sixty-three per cent. of the canal is straight, and the curves have radii varying from 19,680 to 3,280 feet; 3½ per cent. of the length being on the minimum curvature. From Holtenau to Rendsburg, about 62 per cent. of its length, the bed of the canal is level; from this point to Brunsbüttel the bed has an increasing fall, commencing with 1:200,000 and ending with 1:25,000. The drainage is toward the west, and it is estimated that about 120,000,000 cubic feet of land and Baltic water will

be discharged daily into the North Sea. The depth of the canal is 9 meters, or 29.5 feet below mean water. The width on the bottom in straight reaches and on curves of over 8,200 feet radius, is 72.16 feet; this is widened to 124.64 feet on curves of the minimum radius. The equation used for curves from 1,000 to 2,500 metres radius is in metres $26 - \frac{R}{100}$.

Passing places with a width, at the bottom of the canal, of 197 feet and about 1,500 feet long, are arranged at an average distance of 7½ miles apart. Slopes vary as the canal is in cutting or in fill; in general they vary between three and two to one to within two metres of the mean water level, where there is a berm from 2½ to 9½ metres broad. From that the slope to one metre above mean water level is 1½:1, which is protected by stone pitching to one metre above mean water. At this elevation in cutting there is another berm 8 feet wide.

At both ends of the canal the locks are double, and are provided with closing gates near the middle of the lock chambers, the leaves of which have large openings which are closed after they are in place on their mitre sills by sliding gates, which are slowly lowered. These gates check the current so that the head and tail gates can be brought into use, after which they are folded back into recesses, having the lock walls flush.

Of the four railroads which cross the canal, two are carried on drawbridges and two on fixed bridges which have a clearance of 137.75 feet above mean water. In addition to the railroad bridges there is one highway drawbridge, and there are also fourteen ferries.

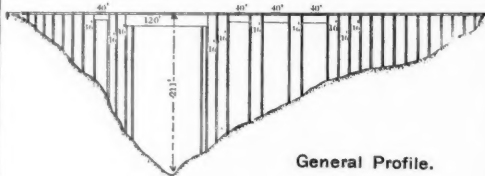
The total excavation was about 105,000,000 cubic yards, and the approximate cost was \$39,000,000. The proportion of work done in the dry is not known, but in 1892 twenty land and forty-two floating excavators were in use. Many of the latter were pump dredges, and where other dredges were used the spoil was carried by the aid of water on to the adjoining land. The marshes on the line of the canal which were moss and sedge peat, with clay, and would not stand with a slope of 4 to 1, when excavated were treated with longitudinal dams of sand. In general, these sand dams were carried forward from the finished end, by means of cars holding about four cubic yards. The surface, when tough, was excavated on the inside of the dam, and a narrow dyke was built which was subsequently raised and widened on the outside. This plan was generally successful in preventing the dam sliding into the proposed bed of the canal. The upheavals of the marsh frequently extended entirely across the canal, and in some instances rose more than 10 feet above the original surface. On one length of five kilometers the mass upheaved amounted to 42 per cent. of the deposited sand; on another section of equal length the upheavals were 19 per cent. in volume of the sand dams. After six months' settlement the excavation of the canal between the dams was commenced; first in the dry with carts, and completed with dredges.

At the Holtenau locks it was found that underneath the bed of clay on which the foundation was to be laid there was a stratum of sand carrying water under such heavy pressure that it rose in a tube 13 feet above the mean water level of the canal. As it was thought this might break through the clay stratum on which the foundation was to be laid, three masonry wells with inside diameters of 11½ feet were put down to the water bearing stratum outside of the lock excavation; a year and a quarter of continuous pumping lowered the water surface about 50 feet, giving a comfortably dry foundation. For many of the facts given here we are indebted to the paper by Mr. Filscher, published in the *Transactions* of the American Society of Civil Engineers, November, 1893.

Rocky Mountain Work on the Great Northern.*

BY JAS. H. KENNEDY. *M. Can. Soc. C. E.*

The Great Northern Railway system, composed of the old St. Paul, Minneapolis & Manitoba, Montana Central, Eastern Minnesota, Fairhaven & Southern and other railways, under the control of Mr. J. J. Hill, is the last edition to the increasing number of transcontinental railways competing for business between the Pacific slope and the East. The surveys for the Pacific extension of this system were begun in the year 1889, and, with the exception of the Cascade tunnel, construction was finished in 1892, so that by the use of a switchback in the Cascades, the line was opened for through business. This line is unique in being the only through line ever built over the



General Profile.

Rocky Mountains without government aid either as a subsidy or land grant; and it is claimed to have advantages in the way of grades, distance, etc., over its competitors. This of course is the second line over the summit of the Rocky Mountains owned by this company, the other being from Helena to Butte City, Montana.

This paper is written with a view to giving the members of our Society a little information with respect to the details of the surveys and construction in the main range of the Rocky Mountains, with the hope of provoking a discussion that may elicit from others possessing it, more complete information, as well as to draw forth a comparison with the other transcontinental lines, or

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with similar work elsewhere; and let it be remembered that the information here intended to be given is limited to the Rocky Mountain section, or, say to the part between Havre on the east and Kalispell on the west side of the range—a distance of 260 miles. Of this 260 miles the first 150 from Havre to Blackfoot was mostly ordinary prairie work, and offers nothing specially interesting, except indeed the two high bridges crossing the Cutbank and Two Medicine Creeks. These bridges will be noticed later. Again, on the west side, from Coram to Kalispell, 25 miles cannot be said to be mountain work, although quite as heavy in one or two places. That leaves an intermediate distance of some 85 miles that may fairly be called mountain work, and it is to this latter district that this paper is more particularly intended to apply.

Location.—The general route selected to be explored was through the Marias Pass and down the Flathead River to the Flathead Valley, and the exploration was made in the winter of 1889 and 1890 with great difficulty by an engineer on snow-shoes, aided by old trappers and hunters. The plan decided on was to start in from the west side of the range and follow up the middle fork of the Flathead River to as near as possible to the Marias Pass, and to return from the Pass by following down a creek, since called Summit Creek, some 12 miles to its outlet into the Middle Fork of the Flathead, thence down this latter river to the Flathead Valley. The difficulties and hardships met with in making this trip in midwinter with several feet of snow on the ground in the face of cold and hunger, and in which the participants were at one time feared to have been lost, cannot be very well described, but can be appreciated by those who subsequently passed over the same ground. The route, however, was reported as quite favorable, the elevation of the summit being about 5,200 feet, with no insurmountable difficulties to be overcome.

The route leading up to the Pass from the east had been known for some time to be quite practicable, the writer being unable to say who explored it, or who discovered the Pass. It is claimed by some, however, that the Pass was known to the Indians for nearly a century and had been used by traders of the Hudson Bay Company. Be that as it may, there is still to be found the evidence of an old and pretty well defined trail leading up towards the Pass from the west side, but it divides up and becomes so obscure in places that it is hardly possible for a stranger to follow it up. Indeed, a party who made the attempt was, after 10 days search for the Pass, compelled to return for a guide without having found it. In the spring of 1890, three survey parties were placed in the field to make preliminary surveys.

There were a few places along Summit Creek and on the Flathead that showed evidence of former snowslides, where the timber had been stripped off in streaks from the top of the mountain to the bottom; but there seemed to have been no slides of recent occurrence, and they had no influence on the location, the plan adopted being to make the location to suit the ground, and decide on the protection of the roadbed from snowslides afterwards if it should be found necessary. From the summit down Summit Creek, the fall is such that the grade (a 1.8 p. c.) crosses the Flathead at the mouth of the creek about 140 feet above the water, and the valley of the middle fork of the Flathead from here for a few miles down the river may be said to be reasonably straight. This valley, however, is about 120 feet above the water, and the stream meanders from side to side, so that at each point where the stream cuts into the side of its valley, there is a cut bank extending up the side to a higher bench. The work of carrying the survey lines over the face of some of these cut banks was both difficult and dangerous on account of the liability to slip down, and also on account of the stones that were continually dropping as they became loosened. The material was cemented gravel. Further down the river the rock closed in on both sides, forming a canon for several miles. Through this canon the grade line was carried about five feet above high water mark.

The following instructions for the location were given by the chief engineer, viz: Limit of curvature, 10°; shortest tangent, 200'. These limits were strictly adhered to during the location. There was no transition curves used, strictly speaking, in the location, but where practicable, the sharper curves had one or two stations at beginning and ending with twice the radius. For instance, a 10° curve would begin and end with a station or two of a 5 where there was room to get it in.

The following data were also laid down by the chief engineer as a guide in making location, viz: One foot in distance is worth \$10; one foot in rise and fall up to 10 ft. is worth nothing; one foot in rise and fall over 10 ft. is worth \$500. Or in other words, a summit of 100 ft. is equal to a mile around. One degree of curvature is worth \$50, or that amount might be expended in order to eliminate one degree of curvature.

These, of course, were not intended to be very exact values for curvature, distance, or rise and fall; but considered to be somewhere near the truth, or near enough for all practical purposes; so that, by using these figures in calculating alternative locations, no very great error of judgment could take place in deciding which to adopt. These figures, with a list of approximate prices for rock, earth, bridging, tunneling, etc., were adhered to during the location, which was completed with the exception of a few minor revisions in January, 1891.

As to grades, suffice it to say that the summit is reached from the east with a maximum grade of 1 per cent. From Summit to Essex, about 14½ miles, there is a down grade of 1.8 per cent., and from Essex westward to and across the Flathead country, the maximum down grade is 0.8 per cent., with a maximum of 0.6 per cent. against west bound traffic. Compensation for curvature at the rate of .04 per degree was used on all maximum grades.

In the fall of 1890, while the location in the mountains was progressing, a supply road was begun from each side of the range and carried to completion shortly after the completion of the location, or about the first of February 1891. The weather during the early winter had been very favorable, and very little snow had fallen; otherwise it is doubtful if the supply road could have been completed that winter, as snow began to fall on the 1st of February and continued until it was six or seven feet deep. It continued quite stormy until April. The supply road, however, was no sooner completed than contractors were on the ground engaged in hauling in supplies and opening up their heavy rockwork.

Construction.—Construction operations were carried on simultaneously from both sides of the range. The necessary supplies for the west side had been shipped from St. Paul to Ravalli, a station on the Northern Pacific, west of Missoula, and hauled from there 30 miles to the foot of Flathead Lake. Thence taken by steamboat to Demersville, 60 miles, and stored there before the close of navigation on the lake. Demersville thus became a distributing point for the work both east and west of the Flathead country.

Grading was classified under the four following heads: solid rock, loose rock, cemented gravel and earth; and

the following may be quoted from the classification viz:

"Solid rock will include all rock in place (except slate, shale and sand rock, and disintegrated granite that can be removed without frequent drilling and blasting), and detached rocks or boulders which measure one cubic yard or more, in removing which it is necessary to resort to drilling and blasting."

"Loose rock will include all detached masses of rock measuring one cubic foot and less than one cubic yard, and all slate, shale, sand rock, and disintegrated granite, which can be removed by picks and bars without frequent drilling and blasting, although blasting will be occasionally resorted to."

"Cemented gravel will include compact earth, hard pan, cemented gravel deposits and all material, except solid rock and loose rock, as above described, which cannot practically be plowed."

"Earth will include all material in excavation of every description not embraced in the foregoing classifications for solid rock, loose rock, and cemented gravel."

"Embankment will include all borrowed material for formation of roadbed or for other embankments wherever required."

The free haul for earth was 300 feet, and for classified material 1,000 feet. When the haul extended beyond 1,000 feet, embankment price was added to the price paid for excavation.

The rock was not a very difficult material to handle in most cases. It varied from slate and sand rock to a hard brittle quartzite, and all tilted up to a dip of about 40 degrees to the northwest. There were a few instances of cemented gravel that were as difficult to remove as rock, or more so, where powder had to be used to shake up the material; but in general the material varied so that it was difficult at times to decide what classifications should be given. The method adopted, however, was to classify the harder material as cemented gravel and the looser as earth, with a varying percentage of classified material according to hardness. It will be noticed that the specification for cemented gravel is somewhat elastic, and leaves considerable to the engineer's opinion as to what he considers "may practically be plowed."

While such a clause as the above in the specification very often enables an engineer to do justice by a contractor by giving him the benefit of the doubt when it might otherwise be impossible, nevertheless it has a tendency to induce contractors to take work at a price they know to be too low with the expectation of getting classified out by the engineer, and this is an evil that appears to be increasing more and more as competition becomes closer.

Road-bed excavations were made 20 ft. wide at grade and slopes, 1 to 5 in rock, and generally 1 to 1 in earth; but this latter was not strictly adhered to in all cases, however, for various reasons. There is a class of hard pan or gumbo in places that was found to stand well at a slope steep enough to keep it dry, but at a slope flat enough to allow it to get wet it became semi-fluid, and ran down upon the road-bed. Again, there are places where a 1 to 1 slope would run into the mountain side, the natural slope being about the same. In these cases steeper slopes were used.

The width of embankment for 5 ft. and under was 14 ft., and for over 5 ft., 16 ft. wide at grade; slopes 1½ to 1, except along streams, where they were made 2 to 1 for rip rap or slope wall. (See Plate VIII.). The primary difference between these two classes is that slope wall is supposed to be hand placed and rip rap thrown down more roughly.

Prices ranged about \$1.00 per cubic yard for rip rap, and \$1.50 for slope wall.

A considerable part of the grading was done by stationmen in small contracts of a few stations each; and on account of the difficulty of getting heavy plant into the country, and cost of maintaining horses, much of the material was hauled out of cuttings in "Swede carts;" that is an ordinary dumping cart turned about to run backward, and hauled by men, while one of them directs it from behind by a long pole which replaces the ordinary shafts. Others made "godevils" to run on rollers on a wooden track, while for short hauls others used trays to slide on greased poles. These "godevils" were hauled by horse power, of course.

Pile foundations were used where practicable to drive piles; and where they could not be driven on account of rock, cedar mud sills were set, or cribs were built and filled with rock. There were no special difficulties met with from the nature of the materials in foundations; of course it will be remembered that there were no heavy masonry piers or abutments erected. A detailed account of the foundations of the 4 large bridges cannot be given here with accuracy.

There were places on steep side hill where cribs or retaining walls were necessary to maintain the slope of embankment. These cribs were built of round logs according to the general plans (see Plate VIII.), and were paid for at a stated price per lin. ft. of logs in structure when completed.

The track, a 68-lb. steel rail with 36 in. angle bars, with 6 bolts and hexagonal nuts, was laid with square joints and 16 ties to the rail. The rails were cut in 30 ft. lengths with a number cut 29' 6" for inside of curves. These short rails had their ends painted at the mill, so they could be readily detected, and the tracklayers were furnished with a list of the curves and the number of short rails required for each. This was found to be an excellent plan to keep square joints, and the writer believes it to have been an original idea with Mr. Beckler, not having seen it elsewhere. The Holman track-laying machine was used, and the daily progress some days reached 160 stations. The rails, of course, were curved in the material yard and loaded on cars in the order required to fit the curves, without any assorting at the end of the track.

The ties used in the mountains were 7 in. thick, 7 in. face and 8 ft. long, of fir and tamarac. The contract price was 25 cents each, and, as stated, they were laid 16 to the rail, or 2,816 to the mile.

The grading was all done by Messrs. Shepard, Siems & Co., contractors of St. Paul. From Havre to the summit was done by contract, and from the summit west to the crossing of the Columbia River in Washington was done by the same firm on a percentage basis. The Railway Company thus retained an interest in the supply stores.

The prices given in this paper are those paid by Shepard, Siems & Co. to their sub-contractors west of the summit.

The timber was mostly furnished by the Boston & Montana Commercial Co., of Helena, and the structures were erected by Porter Bros., of St. Paul. Timber work was all done at a stated price per M ft. B M, but the writer is unable to give those prices with certainty.

There are five tunnels in the district under consideration, all west of the summit. They vary in length from 180 to 780 feet, the total amounting to about 1,600 feet of tunneling. Of this, the whole, with the exception of about 150 feet, is timbered. There were no special difficulties connected with the tunnels, the whole being in rock, and sufficient timber was obtained close by. The timber used was hewn tamarack and red fir. Logging was of red fir 4" x 6". Tunnel work was let at a

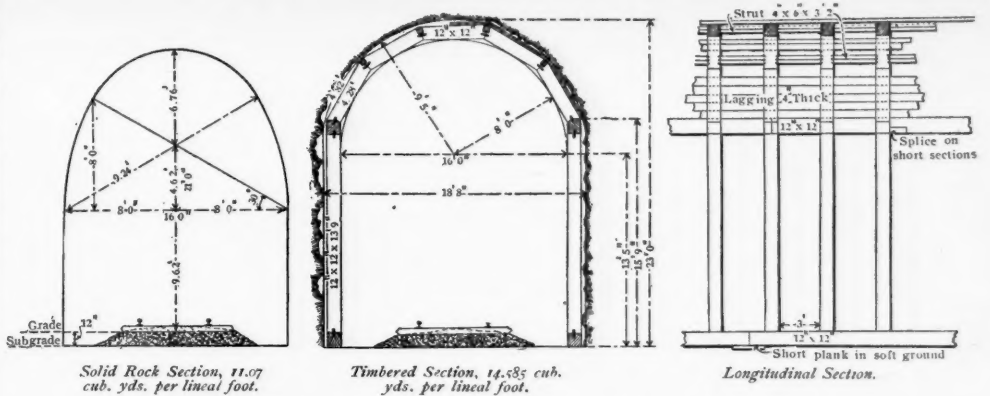
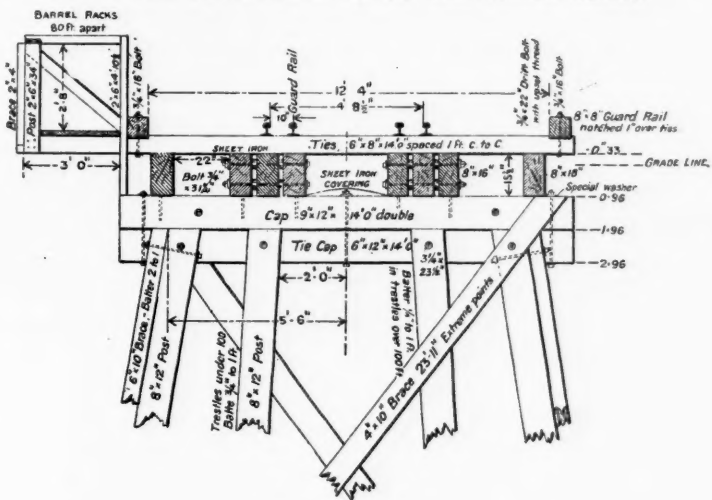


Plate V.—Standard Sections for Tunnels—Great Northern Railway.



Cross Section of Floor, Two Medicine Bridge.

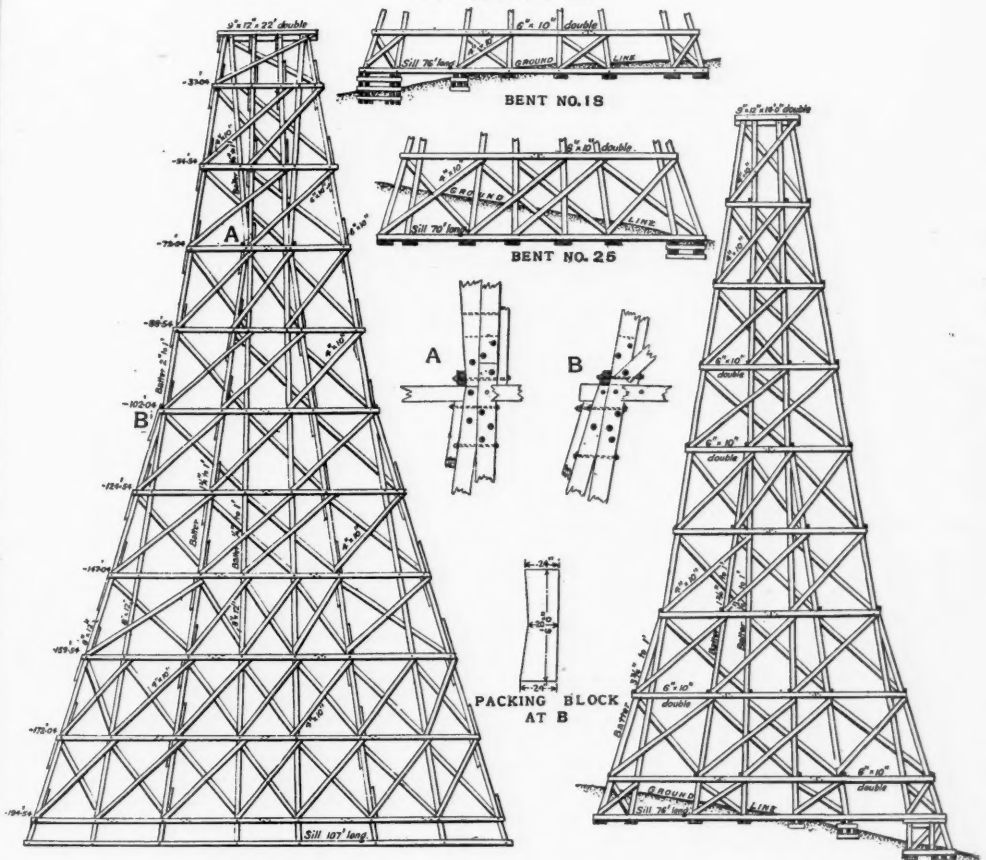


Plate VII.—Two Medicine Bridge—Great Northern Railway.

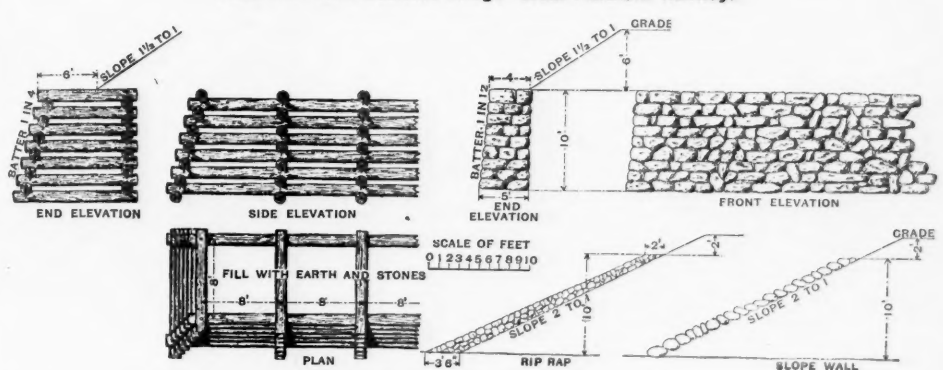


Plate VIII.—Great Northern Railway.

stated price per lineal foot for the standard dimensions, and when necessary to be enlarged for timbering the increase in size was paid for per cubic yard. Timbering was paid for at a rate per M. ft. B. M. The drilling was all done by hand. (See Standard Sections, Plate V.)

The drilling in both tunnels and open cuttings was done by hand, there not being a steam or electric drill on the district. The tunnels were all in rock, and were excavated in this way. An upper heading of about 7 feet high was carried forward and kept several feet ahead of the bench. In this heading the timber plates were carefully set in varying lengths, depending on circumstances, and the arch timbers and lagging put in place; after which the space around the arch was well packed with rock or cordwood. The sills and posts were placed afterwards according as the bench was removed to admit them. The specification called for rock packing around the timbers, but contractors preferred to use cordwood instead, and they were allowed to do so by furnishing the wood at their own expense. The wood is much more convenient for handling than rock, and probably as good in every way. The timbers were kept protected from getting shattered by shots and flying rocks by slabs of wood spiked to their faces; but occasionally a timber would get shattered so that it would be necessary to remove it, no matter what care was taken to protect it.

The bench was always kept up as close to the heading as possible, so that as much as possible of the material shot from the heading would fall clear of the bench, thus avoiding the labor of removing it. This item of clearing off the bench after a shot is often important.

About 16 drillers, or say 7 men in the heading and 9 on the bench, is as great a force as can be worked advantageously at one time. This was the force worked in No. 4 tunnel, which was worked from one end only. This was probably the most difficult to work, and working the usual hours per day the monthly progress was from 30 to 35 ft.

It was not always necessary to keep the timbering in place close up to the workmen. In one case the timber was not put in place until the excavation was completed; and had not the timber been on the ground and framed before the completion of the excavation, it might not have been used at all, as the roof turned out better than was expected. Material from tunnels was hauled out in ordinary carts.

There are four high wooden bridges in the district under consideration; two on the east side of the range crossing the Cutbank and Two Medicine Creeks, and two crossings of the Flathead River on the western slope. The Cutbank bridge is about 1,200 feet long and 180 feet high, and consists of 1 span 120 feet, Howe truss, five 40-ft spans, pony truss, and the rest 16 feet span trestle bents. The Two Medicine bridge is probably one of the highest timber trestles ever erected, being 751 feet long and 211 feet high. It consists of one span of 120 feet, 4 spans of 40 feet each, and the rest 16 feet spans. This bridge contains about 750 M. ft. B. M. of timber. (See Plate VIII.). The two crossings of the Flathead River are 140 and 90 feet high respectively, and each contains one 150-ft. Howe truss and a number of 16 feet openings.

The special features of these high trestles (original with Mr. Beckler) are continuous posts from foundation to cap, packed at every story with 4"x12" plank 6' long. (See Plate VII.). The stories are all 17½ feet high, so as to permit the use of 18 feet lengths in posts, and also to avoid using too long pieces in the longitudinal and sway braces. Long timber is not very plentiful in Montana. The inside posts have a batter in order to afford a better system of bracing in the lower stories than could be had with plumb posts, and additional posts are inserted as the height increases. The assembling of the various parts is made in such a way that the trestle is easily raised piece by piece, and any piece can be removed without disturbing other parts of the bridge.

The floors are 6 in. x 8 in. ties laid flat, and spaced 12 in. centre to centre. Inside and outside guard rails are used, well notched down and bolted.

The timber was mostly cut and sawn by portable mills in the vicinity of the bridges. Red fir was used for all stringers, as it is by far the best timber for the purpose to be found in Montana. White pine is scarce, but Norway pine is more plentiful, and was used for posts and caps where fir was scarce.

Outside of those four large structures the smaller bridging and trestling was very light considering the rough character of the country. Fir timber was used for piling and stringers, and indeed it was used for all purposes when it could be had, which was not always the case.

The following is a partial list of the prices paid to contractors on this work:

Solid rock.....	\$ 0.90 to \$1.00 per cubic yard.
Loose ".....	0.35 " " "
Cemented gravel.....	0.35 " " "
Earth, etc.....	0.16 " " "
Embankment.....	0.16 " " "
Tunnel.....	40.00 per lin. ft., stan. sec.
Tunnel excavation.....	1.50 per cubic yard.

The latter item was for enlarging the standard section to admit the timbering when necessary. Ordinary labor cost \$1.70 to \$2.00 per day.

The above prices will no doubt be considered low in comparison with prices paid for similar work elsewhere, and it may be here said that while there were no fortunes made by contractors, it is believed that all or nearly all their competent men pulled through with more or less to their credit. As before stated, the most serious drawback was the expense of hauling in supplies; consequently, the maintenance of the camps was a serious drain on the profits of the work.

In regard to the cost of the work, the writer regrets having no estimates at hand, with the exception of 20 miles between Nyack and Coram. The heaviest mile in this 20 was 43,000 cubic yards, and the average cost of grading for the 20 was \$14,200 per mile, but in this is included three miles of a flat where the work was light, and which considerably reduces the average from what it otherwise would be, to 30,000 cubic yards per mile, from Nyack to Summit the quantities were considerably heavier.

Mr. E. H. Beckler of Helena, Mont., was chief engineer of this work, and his organization of his staff was this: the whole work was divided into divisions in charge of division engineers. These divisions were subdivided into residencies in charge of resident engineers, who reported to the division engineer; and each residency was subdivided into sections of 6 to 10 miles, with an assistant engineer in charge of each, who reported to the resident engineer. The length of these divisions and residencies of course varied considerably according to the difficulty of the work in that particular locality.

DISCUSSION.

Mr. R. W. Leonard said the specification regarding over-haul is rather unusual, and seems hardly fair to the contractor or to the company. The prices are exceptionally

low as compared with prices which we are accustomed to pay in the West.

Mr. C. B. Smith said he would like to call attention to the specifications, which were similar to several he had worked under. They were very elastic, and the loose rock clause particularly covers a large class of materials very easily worked, while the solid rock clause could be similarly extended. He had worked under prices of 64 cts. for solid rock, 32 cts. for loose rock, and 16 cts. for earth which included hard pan. The whole thing was absurd, and contractors persisted in taking work at these prices, looking to the engineer to help them out by classifying.

He wished to heartily concur with the author on this question. He sincerely hoped that such objectionable prices would never get across the border, but that prices in Canada would be kept at such figures as would enable engineers to classify to the letter and at the same time to do justice to the contractor.

Mr. W. B. Mackenzie said: The classifications of solid rock, loose rock, cemented gravel and earth appear to be excellent, with the exception that the upper limit for loose rock is too high. In the writer's opinion it should be placed at one-half a cubic yard, or perhaps as low as one-third. Large boulders measuring over half a cubic yard are more troublesome to dispose of than solid rock, and should be classed as such.

Cemented gravel is a classification which should have appeared in our specifications at an earlier date. The writer has seen cemented clay and gravel more difficult to remove than solid rock, yet the contractor had to take earth price or nothing. In many parts of New Brunswick and Nova Scotia, only the first three or four feet below the surface, which is acted upon by the frost, can be called earth; below that point it is all hard pan.

The writer believes the "schedule" system of letting railway work is preferable to the "lump sum" method. In the latter the company either pays too much or the contractor loses too much; the fair and reasonable price is seldom paid. Unless distribution profiles, full and complete quantities and detailed working plans are furnished to intending contractors, as is done in England, offers on the "lump sum" method are simply guesses. To see the end from the beginning, through the fog and indefiniteness of an earth-embracing general specification and an outline plan and profile, as is sometimes attempted, is more than mortal man is equal to; hence, offers are close, or wide of the mark, according to the inherited or self-acquired experience of the would-be contractor.

Too often the inexperienced man gets the work because his price is the lowest; and, war being duly declared against the engineer, construction drags slowly along to a completion, which is satisfactory to no person in particular, and least of all to the contractor himself.

The schedule prices given in the paper for solid rock, 90 cts. to \$1.00 per cubic yard, appear remarkably low, considering that all the drilling was done by hand, and the price of ordinary labor \$1.75 to \$2.00 per day.

Making the rock slopes 1 to 5 in stratified rock, instead of 1 to 4, as is common, is a very good idea.

For the embankment along streams, it seems to the writer it would have been cheaper, and equally as good, to allow the earth to take its natural slope of 1½ to 1, and increase the thickness of the rip rap and slope walls. To make the slopes 2 to 1 must have required considerable extra labor in placing the material.

The sectional outline of the timber crib retaining wall is a good one. In its construction, however, the writer would suggest slight improvements as follows:

1. That the crib begin with a longitudinal at the bottom and end with one on top.
2. That the cross-ties be fastened to the longitudinal.
3. That a ballast-floor be placed on the second cross-tie from the bottom.
4. That the crib be filled with stones above and below the ballast-floor.
5. That the cross-ties be placed alternately instead of directly over each other.

Nos. 3 and 4 may not be needed in this particular case. Mr. Kennedy in reply, said: The specification regarding over-haul, although unusual in Canada, is more common in the Western States, and all that can be said in its favor as far as the author can see, is that it saves the trouble of calculating over-haul in many cases. There certainly appears to be very little advantage visible to the contractor, who finds his embankment running out further than he expected. When the haul reached 1,000 ft., the contractors were generally given permission to waste from the cutting and borrow to make the bank, if they found it more convenient, than continuing the haul from the cutting, and they always did so when good material was close at hand.

The specifications for loose and solid rock gave good satisfaction, and were well suited to the materials in that locality. The greatest difficulty the engineers met with in classifying was with the cemented gravel where it was necessary to allow only a percentage of the classified material.

In reply to Mr. McKenzie, he would say that in the few places where earth embankment was made along the Flathead River, there was little or no extra work required in making the slope 2 to 1, as the current was rapid and washed out all the fine material as it was thrown into the water, leaving only the stones and coarse gravel, while the largest stones were rolled out into the stream and formed the rip rap. Of course, all the material used contained a considerable percentage of stones, and the coarser was placed next the water, as far as possible. In this way some contractors made the rip rap without much extra labor, and for which they were paid. He presumes they made it pay for any extra work in flattening the slope of the embankment, as there was no "kicking" on that score.

The author recognizes the improvements suggested in the cribwork, especially that the crib should begin with a longitudinal in the bottom.

The general plans for cribs (Plate VIII) were varied considerably to suit the particular places where used, there were none required or used of more than a very few feet in height. In one particular place, to ensure safety, a longitudinal was laid in a trench dug along the center line of roadway, and long top cross-ties were well notched down over it, and well spiked to the three longitudinals. This was thought an excellent plan.

The worst slide that occurred during construction was where a heavy embankment slid on the sloping face of the rock several feet below the natural surface. It was so close to the entrance to a tunnel that the alignment could not be changed, and the only remedy seemed to be to remove part of the embankment and build a trestle benching off the rock for each bent. The trestle was built, and, as far as the author knows, is a success. At another place, the embankment gradually settled for several days, and at the same time the flat below gradually moved until an island arose in the river which seemed to form footing and the settlement ceased and gave no further trouble.

Iron and Steel Production in 1893.

The statistical report of the iron and steel production of the United States was issued by Mr. Swank, more than three months later than usual, but the delay has given him an opportunity to include statistics of the production of pig iron and Bessemer steel for the first six months of 1894.

The period covered by the report was one of disaster to the iron and steel industries, as it was to nearly every other business. Production and consumption shrank enormously, the make of pig iron falling off over 2,000,000 tons or 22 per cent. as compared with 1892, the total being less than in any year since 1886. The fall in prices, which started early in 1890, after the high prices of the latter part of 1889, has continued in all branches of the iron and steel trades.

The year opened with a fair demand for iron and steel products, though prices were so low that Mr. Swank states that iron and steel making in this country was carried on at a loss, except in a few lines. He adds that over 100 failures of iron and steel makers and merchants and iron ore producers were reported in 1893. We give a summary of the more important figures, published in the report.

	IRON ORE.	1892.	1893.	Decrease.
Consumption (estimated).....	17,400,000	13,480,000	3,920,000	
Total production.....	16,296,666	11,587,629	4,709,037	
Shipments from Lake Superior.....	9,069,556	6,060,492	3,009,064	
Imports.....	806,585	526,951	279,634	

The production was the smallest since 1887, and the importation the smallest since 1885. The prices of a few grades of Lake Superior ore were:

	1892.	1893.	1st Half 1894.
Republic and Champion No. 1.....	\$5 50	\$4 50	\$3 35
Specular No. 1, non-Bessemer.....	5 00	4 00	3 00
Chapin.....	4 25	3 65	2 50
No. 1 Bessemer Hematites.....	4 50	4 00	2 75

No. 1. Mesaba iron ore has sold in 1894 for \$2.50 a ton at lower lake ports.

	COAL AND COKE.	1892.	1893.
Production, coal (gross tons).....	160,115,242	162,814,977	
" coke (net tons).....	12,010,829	9,477,580	

The prices of coke for net ton ranged in 1893 from \$1.90 down to \$1.00, and in January, 1894, it fell to 85c. The circular prices of anthracite ran higher in 1893 than in 1892.

	PRODUCTION OF PIG IRON.	1890.	1891.	1892.	1893.
United States.....	9,202,703	8,279,870	9,157,000	7,124,502	
United Kingdom.....	7,994,214	7,406,064	6,709,255	6,829,841	
Germany.....	4,658,451	4,641,217	4,937,461	4,966,063	
France.....	1,962,196	1,897,387	2,022,989	2,057,258	
Belgium.....	787,836	684,126	753,368	760,296	

The production in the United States in the second half of 1893 and the first half of 1894 was 5,279,567 tons, or less than in any year since 1885. The decrease in 1893 was due entirely to the loss in the last half of the year, when we made 2,561,584 tons, the decrease being 44 per cent. Pennsylvania made over 51 per cent. of the pig iron in 1893. Ohio over 12 per cent., and Alabama over 10 per cent.

Of the pig iron produced in 1893, 50 per cent. was classed as Bessemer pig. In 1892, the percentage was 48.5; in 1890, 44.4, and in 1887, when Bessemer pig was first separated, 44.8 per cent. was so classified.

The number of furnaces in blast at the close of 1893 was 137, or less than in any year for the last 20 years. In 1892 the number in blast was 253; in 1891, 313, and in 1890, 311. On June 30, the number in blast was only 108.

Pig iron production in the first six months of 1894 was 2,717,983 tons. This compares with 2,561,584 tons made in the last half of 1893, and 4,562,918 tons in the first half of that year. The Bessemer pig iron, made in the same periods, was 1,501,487 tons, 1,193,708 tons, and 2,374,890 tons respectively. The approximate consumption of pig iron in the last five years, and the amount of stock at the end of each of those years, is shown in the following table:

	1889.	1890.	1891.	1892.	1893.
Domestic production.....	7,603,642	9,202,703	8,279,870	9,157,000	7,124,502
Imported.....	148,759	134,955	67,179	70,125	54,394
Stocks on hand, January 1.....	300,144	283,879	661,858	627,233	535,616
Total supply.....	8,052,545	9,621,537	9,008,907	9,854,358	7,714,512
Deduct stocks, December 31.....	283,879	661,858	627,233	535,616	707,318
Approximate consumption.....	7,768,666	8,959,679	8,381,674	9,318,742	7,007,194

	TOTAL PRODUCTION OF STEEL.	1893.	1892.	Inc. or Dec. per cent.
Bessemer steel.....	3,215,686	4,168,435	D 22	
Open hearth steel.....	737,890	669,889	I 10	
Total (including crucible and other steel).....	4,019,995	4,927,581	D 18	

	PRODUCTION OF BESSEMER RAILS.	1893.	1892.	Inc. or Dec. per cent.
United States.....	1,136,458	1,551,844	D 415.386 = 26 7 p. c.	
Great Britain.....	579,386	535,836	I 43,550 = 7 4 p. c.	

The production in the United States was the smallest since 1885. In Great Britain the production of Bessemer rails in 1892 was the smallest since 1879.

The following table, showing the production in the United States of various articles, will be of interest:

	1893.	1892.	Inc. or Dec.
Plates and sheets.....	674,345	751,460	D 77.115
Structural shapes.....	387,307	435,957	D 66.650
Wire rods.....	537,272	627,829	D 90.557
Kegs of cut nails.....	3,048,933	4,507,819	D 1,458,886
Kegs of wire nails.....	5,041,945	4,719,524	I 322,421
Iron and steel ships.....	94,532	51,374	I 43,158

The tonnage for shipping given above does not include vessels built for the United States Navy.

The average yearly prices, for four years, of certain products, are shown in the following table. The figures are averaged monthly quotations. They are for long tons,

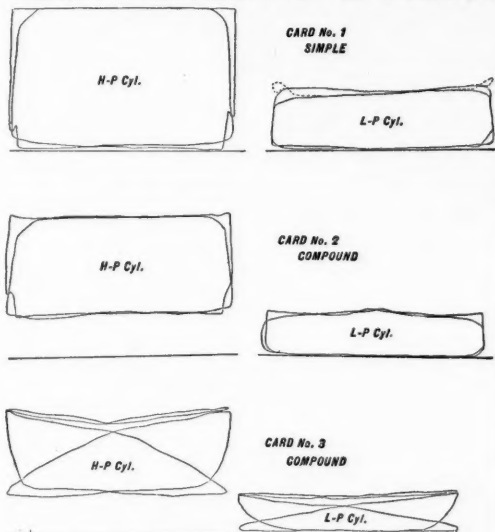
except those for bar iron, which is quoted by the 100 lbs:

	1890.	1891.	1892.	1893.
Old iron T rails, at Phila- delphia.....	\$25 18	\$22 05	\$19 48	\$16 43
No. 1 anthracite foundry pig iron at Philadelphia.....	18 40	17 52	15 75	14 52
Gray forge pig iron, at Phila- delphia.....	15 82	14 52	13 54	12 73
Gray forge pig iron, Lake ore, at Pittsburgh.....	15 78	14 06	12 81	11 77
Bessemer pig iron, at Pitts- burgh.....	18 85	15 95	14 37	12 87
Steel rails, at mills, in Penn- sylvania.....	31 75	29 92	30 00	28 12
Steel billets, at mills, at Pittsburgh.....	30 32	25 32	23 63	20 44
Refined bar iron, from store, Philadelphia.....	2 05	1 90	1 87	1 70
Muck bar iron, at Pitts- burgh.....	1 85	1 71	1 64	1 50

The prices for No. 1 anthracite foundry pig iron at Philadelphia, were \$14.80, in January, 1893, and dropped steadily to \$12.50 in July last. Bessemer pig iron was quoted at \$13.59 at Pittsburgh, in January, 1893, and \$12.60 in July, 1894.

Richmond Compound Locomotive.

In the *Railroad Gazette* of March 9, 1894, there appeared a description of a two-cylinder, compound freight locomotive built by the Richmond Locomotive & Machine Works for the Cleveland, Cincinnati, Chicago & St. Louis Railroad Co. This locomotive was of the ten-wheel type,



Indicator Cards Compound Locomotive No. 472-C, C. & St. L. Ry.

weighing 137,000 lbs., with 19 and 30 x 24-in. cylinders and 56-in. drivers. With the exception of the compound feature, the locomotive was built from the drawings of the railroad company.

In the article above referred to, an abstract was made from figures given in the performance sheet of the road for December, 1893, showing the relation between the coal consumption of this engine and single expansion engines of the same class and in the same service. At the convention of the Master Mechanics' Association at Saratoga last June, Mr. William Garstang, Superintendent of Motive Power of the Cleveland, Cincinnati, Chicago & St. Louis, read the following statement concerning the performance of the locomotive:

"Miles run to the ton of coal for five months ending April 30: Compound engine, 23.35 miles; simple engine of same class, 16.94 miles. Pounds of coal consumed per loaded freight car mile: Compound engine, 3.92 lbs.; simple engine, 5.52 lbs.; a difference in favor of the compound engine of about 29 per cent. saving."

Mr. W. S. Morris, Superintendent of Motive Power of the Chesapeake & Ohio, credited the compound locomotive on his road with a saving of 26 per cent. over the single expansion locomotives of the same class, and stated further that after having been in service for nearly two years, the repairs were found to be much less than average repairs on the single expansion engines.

We show herewith some indicator cards taken from locomotive No. 472 of the Cleveland, Cincinnati, Chicago & St. Louis, which show the steam distribution when working either compound or single expansion. An interesting feature of these diagrams, aside from the good steam distribution shown, is the large gain in power due to the change from compound to single expansion at a speed of about eight miles an hour, the cut-off and steam pressure remaining constant. It is interesting also to note that with this change the ratio of work done in the two cylinders remains very nearly constant. This holds as well for higher speeds; as may be seen by reference to Card No. 3. The table gives the data for the cards.

DATA WITH INDICATOR CARDS—RICHMOND COMPOUND LOCOMOTIVE.

Card.	Boiler Pressure.	Cut-Off.		No. of Rev's.	Miles per Hour.	Indicated H. P.			Av. Pull on Crosshead.			% Work. in H. P. C.
		H-P.	L-P.			H-P.	L-P.	Total.	H-P.	L-P.	Total.	
No. 1.....	170	21	21.5	48	7.8	272	283	555	46,777	48,714	95,491	49%
No. 2.....	170	21	21.5	50	8.1	196	205	401	32,319	33,207	65,526	48.9
No. 3.....	155	12	12.5	260	42.38	572	578	1,150	18,144	18,356	36,500	49.7

In the *Railroad Gazette* of June 15, 1894, there was given a complete description of the intercepting valve and other special features of the compound system of this company.

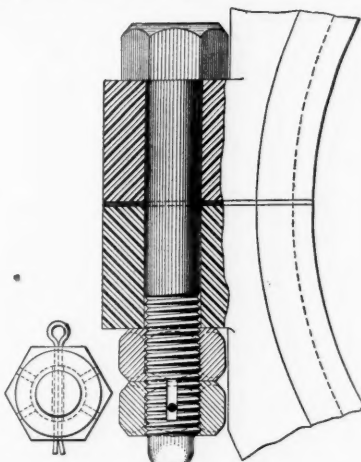
Shop Notes—Wisconsin Central Lines.

The shops of the Wisconsin Central Lines, at Waukesha, Wisconsin, are, for small shops, as has already been noted in the *Railroad Gazette*, particularly well designed and equipped. Although during the past 13 months the amount of work done in these shops has been small as compared with previous years, there has been in various ways a perceptible increase in the facilities of the shop for doing rapid and economical work.

In the blacksmith and boiler shops several new oil furnaces have been installed and are used for heating rivets, tempering springs, welding flues and other purposes. These furnaces are of a new design, very simple and satisfactory. The burner is of a type not extensively used and very efficient. We hope to show this burner in a future issue.

A new vertical, hydraulic press, designed by Mr. James McNaughton Superintendent of Motive Power of the road, has recently been placed in the erecting shop and is used for pressing in driving box and connecting rod brasses and other work requiring considerable pressure. The plunger of this press is adjusted by pressure from the shop mains, amounting to about 20 pounds per square inch, while for heavy work a greatly increased pressure is obtained by means of a small vertical pump driven by a belt from a countershaft.

The tool room of this shop is exceptionally well arranged and cared for. Among the special tools noted is a small jig for drilling holes for cotter pins in the nuts for eccentric strap bolts. The bolt used on this road is slotted on the threaded end for a short distance, as shown in the illustration. The nuts are drilled through from each side, thus making it necessary to give the nut but $\frac{1}{2}$ of a turn to bring some of the holes opposite the slot and make possible a very close adjustment in setting up the eccentric straps.



Eccentric Strap Bolt.

A unique arrangement is the apparatus lately put in for sanding locomotives. A tank of about 1,200 gallons capacity is sunk beneath the floor of the sand-house so that sand can easily be shoveled in through a hole in the top. This tank is built to carry an air pressure of about 50 pounds, and a man-hole cover so fitted over the opening in the top that it can be tightly closed. Extending down nearly to the bottom of this tank, is a four-inch iron pipe, which passes up through the roof of the sand-house and over the two tracks adjoining, the pipe being bent in a curve of long radius, thus avoiding any short turns. Above the second track is a gate valve in this pipe and a short spout. When a locomotive needs sand, it is backed down this track until the sand box is under the pipe, when the spout is adjusted and the gate valve opened. The air pressure in the tank is sufficient to carry the sand up through the pipe to the gate valve, whence it is conducted to the box. The tank, with an air pressure of 45 pounds, will fill three locomotive sand boxes without recharging, and with a loss in air pressure of from 15 to 20 pounds. The air pressure is restored as needed; but the supply could easily be made automatic if that were required.

The Jogada furnace, described and illustrated in the *Railroad Gazette*, of January 26, 1894, has been installed under one of the boilers at these shops and has given excellent satisfaction, both from the standpoint of economy and smoke prevention.

Iron tender frames have been in use on this road for about 10 years with very good results. There are certain points about them which occasionally require renewal or repairing, but these are few, and on the whole the frame has been found to cause very much less trouble than the wooden tender frames. Several switching engines are

An anti-tramp arrangement has recently been devised by Mr. McNaughton for use on the passenger engines running to Chicago. The Company has been considerably annoyed for some time past by persons climbing on the blind end of the baggage car behind the tender and stealing rides. To discourage such populists a small nozzle is placed in the back end of the tender and another in the hood of the baggage car; and a small air-tight tank is put in the back end of the tender, which is ordinarily kept filled with water, and is connected with the main air reservoir in such a manner that air can be admitted to the tank, forcing out the water through pipes leading to the nozzles. These nozzles then deliver a copious shower bath to anyone on the platform. The engineers have instructions to turn the air on and start the water works before making a stop, so that anyone inclined to climb on will see what is awaiting him. The arrangement has proved very effectual. This system is capable of various other applications, which have been covered by patents.

The matter of smoke prevention in Chicago has been met by requiring each engineer to report at the end of each trip whether or not his locomotive has smoked. If the reply is in the affirmative a further explanation is required. The company is thus informed of the facts and able to judge of the justice of any complaint.

Reasonableness of Freight Rates on the Great Northern.

The Great Northern Railway has appealed from the order of the Minnesota Railroad Commission, making reductions in grain rates, and has filed a lengthy argument, supported by affidavits, going to show that the present rates afford only a fair return upon the money invested, and that the rates on grain are lower than those in force in Nebraska and Iowa.

The argument begins with a statement of the various consolidations on which the present company is based, the substance of which is to show that the cost of the line in Minnesota down to 1880 was upward of \$18,000,000, or over \$23,000 a mile, exclusive of the cost of procuring money for the enterprise which was necessarily nearly 50 per cent. additional. (This avowal of heavy commission payments will probably not have a very soothing effect on the Minnesota granger, who looks upon all such transactions as the thinnest kind of watering.)

The argument next goes on to detail the aid received from the State, and shows that the 1,381 miles of road owned by the company in the State cost \$42,337,050, from which \$5,342,000 received for lands granted by the State is deducted. After making a further reduction for earnings spent in construction, the net cost of the road and appurtenances is estimated at \$26,422 per mile, but the property could not be replaced for \$42,000,000. The bonded indebtedness is over \$19,000 a mile.

The gross earnings per mile in Minnesota last year were \$4,618, which is much less than in the two previous years, and about the same as in 1890. The net earnings per mile last year were \$2,474; of this \$1,324 is attributed to interstate business, which neither originated nor terminated in the State, leaving net earnings from local business and interstate business beginning or terminating in the State, \$1,149. This last named sum is 4.35 per cent. of the cost of the road (\$26,422 per mile). Deducting from the net earnings \$200 a mile, which ought to be set aside for maintenance of property, the net earnings would be only 3.15 per cent. on the cost. Had the order of the Commission been in force last year, the net earnings would not have been more than \$1,057 a mile. The percentage here shown is not enough to pay the interest on the bonds, on some of which the rate is 7 per cent. The total interest on bonds equals \$1,078 a mile, so that the net earnings, if the rates had been as low as the Commissioners now desire, would have fallen short \$20 a mile. The receipts from interstate business last year were 52 per cent. of the total. This percentage has been gradually increasing from 45 per cent. in 1890.

The statement next shows freight rates during the last 13 years. From all prominent points to Minneapolis, St. Paul and Duluth there has been a steady reduction, amounting to 40 per cent. or over, in some cases nearly 50 per cent. The existing rate per ton per mile from Crookston to Duluth on grain is 9 mills.

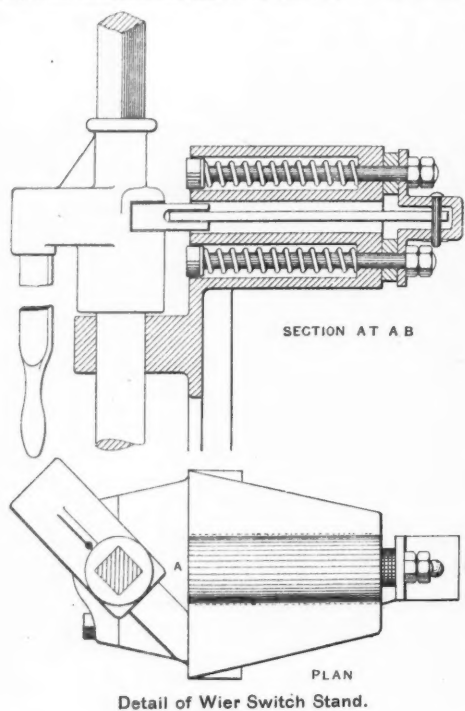
Detailed tables are given of rates in Nebraska and Iowa, compared with those in Minnesota, and the statement is made that the former States furnished five or six times as much freight for the railroads, while the cost of operation there is less. A comparison is made showing that the cost of coal and of repairs to engines is much higher in Minnesota than in Iowa. It is shown that the amount spent for improvement of the road has increased during the last five years, and that the rates of wages have been very largely increased. A table is given, showing that station men and trainmen got 40 per cent. more in 1893 than in 1890, shopmen 25 per cent. more, and trackmen 21 per cent.

About half the cars used to carry wheat have to be returned empty. The business is crowded into the last four months of the year, and this percentage of empty cars is larger than it was a few years ago.

Attached to the statement are affidavits of experienced civil engineers, going to show that railroads in a new country have to be built at first very cheaply, and then straightened and made more level by the expenditure of large sums after the country becomes populated, so that the road can live.

Wier Automatic High Switch Stand.

The illustrations show a new high switch stand made by the Wier Frog Company of Cincinnati. The details are from sketches not drawn to exact scale. The design



Detail of Wier Switch Stand.

is quite a radical departure. As will be seen from the photograph and sketches, the clutch feature is done away with, and thus is eliminated a weak point, as stands having it are apt to leave the points partially open after a train has trailed through the switch. This device also avoids the lost motion due to excessive wear at the clutches.

A V-shaped box, with spring pockets on top and bottom is cast as a part of this stand, and on the back of this box a yoke is bolted connecting with the springs in the pockets, and to this yoke is also attached a fork connecting with a sliding bar, which actuates the lever casting fastened to the crank shaft. By means of the double spring acting upon the fork connected to the sliding bar, a steady and uniform bearing is always had against the lever casting, thus pushing over the crank shaft which forces the switch points tight up against the stock rails, the latter forming the stop for the pressure of the spring; and as there are no stops or clutches confining the movements of the crank shaft, any lost motion

due to wear of parts or widening of gage is overcome by increased throw of crank, thus avoiding the possibility of a "lip" to the switch. This is the chief and peculiar feature of the new stand.

There is no strain on the spring when the stand is being thrown by hand. Owing to the increased leverage obtained by this placing of the spring, the points are easier opened when trailed through, lessening the liability of breakage of switch points and other parts.

The connecting rod cannot be taken off the crank without unbolting the bottom bearing and lifting the crank shaft, and the target shaft can be turned to suit the track.

The Moore Hoisting and Conveying Machine.

The work of completing the large surface drainage sewer on Green avenue, Brooklyn, has been commenced. Instead of tunneling, as in the case of the completed section, which was done by Anderson & Barr, of Jersey City, the earth will be excavated with the aid of the Moore hoister and conveyor.

This machine is the invention of Mr. Thomas F. Moore, of Buffalo, N. Y., and is built by the Moore Manufacturing Co. of that place. The device, shown by the accompanying illustrations, consists of a steel trestle 288 feet

long, built of 16 bents and 32 girder rails, each 18 ft. in length, bolted together with turned steel bolts and braced with angle braces. The whole structure is mounted on double-flanged wheels, journaled in the feet of the cross bents.

The apparatus, together with the power house, travels

the ropes. The other line operates the hoisting chain. As fast as a bucket is filled the chain is lowered into the trench and secured to the bucket. This is then raised to the top of the carrying car where it locks itself automatically. Each bucket has a capacity of 30½ cubic feet and can be dumped through a chute directly into a wagon

acked under the trestle work, as shown in fig. 1.

The travelling car picks up and conveys heavy boulders, and pumps, drills or other heavy machinery, from or to any point in the trench.

The structure is built to stand heavy rock blasting.

The machine in operation in Brooklyn is the tenth one turned out by the company. Some of its other machines were used with success in constructing sewers in Buffalo and Rochester, N. Y., South Bend and Indianapolis, Ind., and several other places. The company claims that a loaded bucket can be hoisted, locked into the conveying car, conveyed the length of the trestle, contents dumped on the back filling and the empty bucket returned to the bottom of the trench in from 30 to 60 seconds, and another loaded bucket picked up. As the whole apparatus, including the power house, is portable, it can easily be taken down or put together in a comparatively short time.

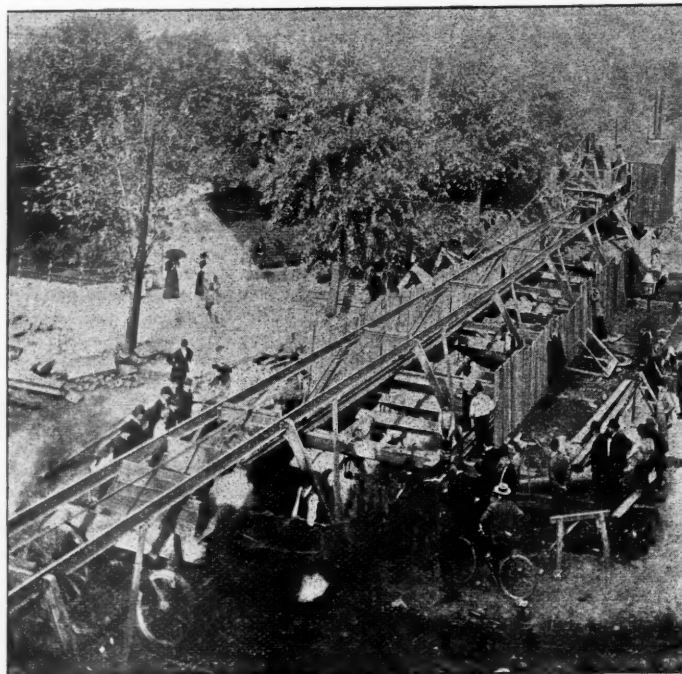


Fig. 1.—Showing Wagon Prepared to Receive Load.
The Moore Hoisting and Conveying Machine.

on a track constructed of 24 30-ft. rails, spiked to Norway pine stringers of equal length. The entire machine can be moved 60 ft. in three minutes. No cross ties are employed in laying the track, thus doing away with the necessity of removing the back filling every time the machine is moved.

The power house contains a 23 h. p. engine with 7x10 in. cylinders and 18x27 in. double drums, and a boiler 42x96 in., vertical type. Around the drums of the engine are wound four-ply manilla ropes for use in operating both the hoisting and conveying machinery.

The buckets used are of the drop bottom pattern and are 10 in number. The conveyor car, which runs on top of the trestle, has a steel framework and is provided with a platform on which the attendants stand. The car is pulled to any desired point above the trench by one of

The excavation in Brooklyn will be 37 ft. deep by 18 ft. wide; the sewer will be 3.2 ft. inside diameter.

Strains and Deflections of Heavy Bridge Floors.

In a paper on the above subject read by Mr. Henry Goldmark before the Western Society of Engineers, the author said:

The present tendency towards heavier railroad bridges should be directed into proper channels so that the extra weight of material may do the most good, and the best way to accomplish this result is to study present and past work in the field as well as the office; and to analyze such "bridge failures" and "accidents" as may occur, so as to avoid constructions that have proved to be weak.

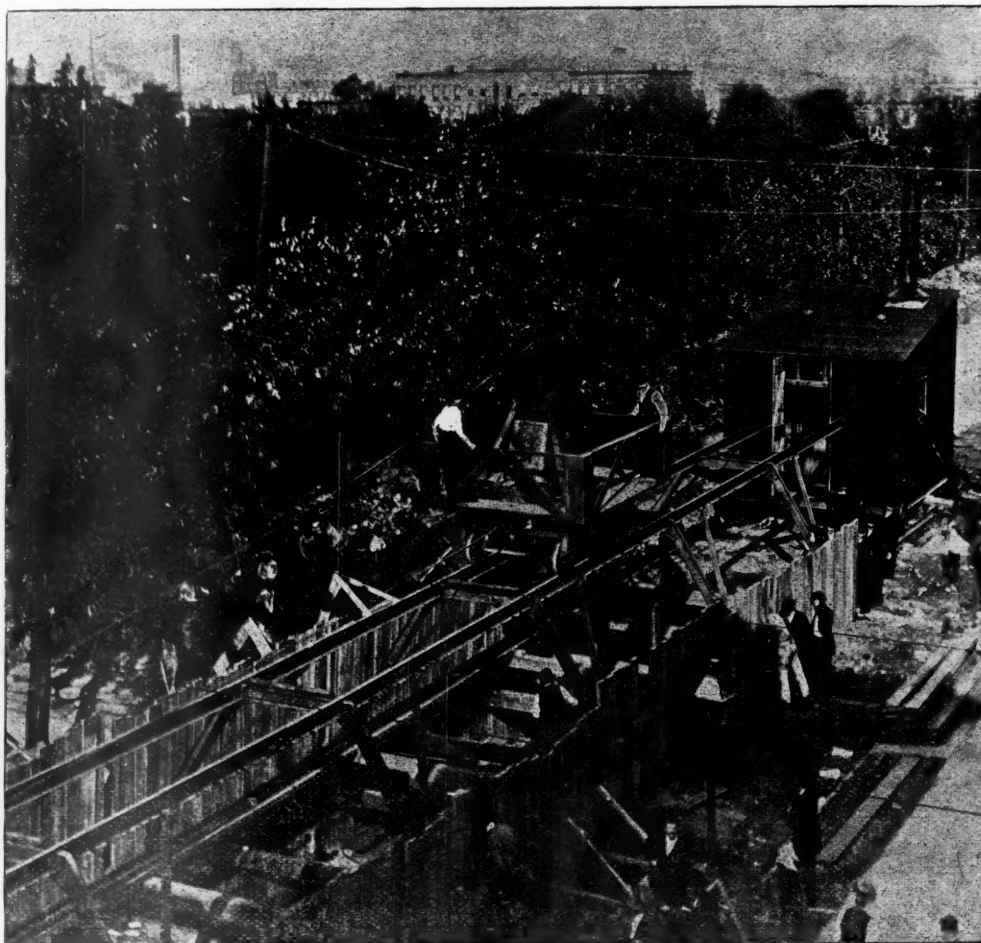


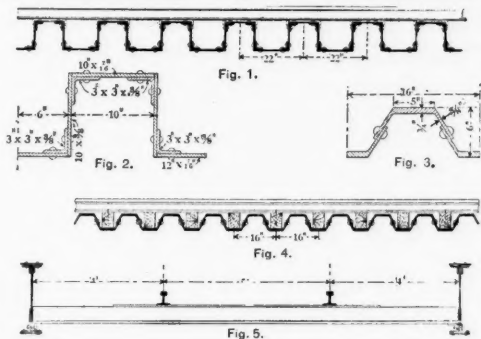
Fig. 2.—Conveyor Car and Power House.
The Moore Hoisting and Conveying Machine.

Bridges should be safe even when trains are in bad order or derailed, and every effort should be made to secure this condition. For this reason the use of plate and strong lattice girders should be encouraged, and an increase in the clearance between trusses is also advisable.

The best field for improvement, however, is in the floor system. Our present open floors, with stringers and floor beams, are likely to cause a disaster whenever a derailed truck reaches them. Guard rails, etc., are mere makeshifts as long as this form of construction remains in use.

Solid floors, with or without ballast, present great advantages in this as well as other respects. They give a continuous floor surface, take up little "depth," form an excellent lateral bracing and are not unduly expensive. They should be far more generally employed than they are.

Of several forms in use in the United States two types are shown in the drawings presented herewith. Figs. 3 and 4 show the floor used by the Illinois Central Railroad in its street crossings in Hyde Park, while figs. 1 and 2



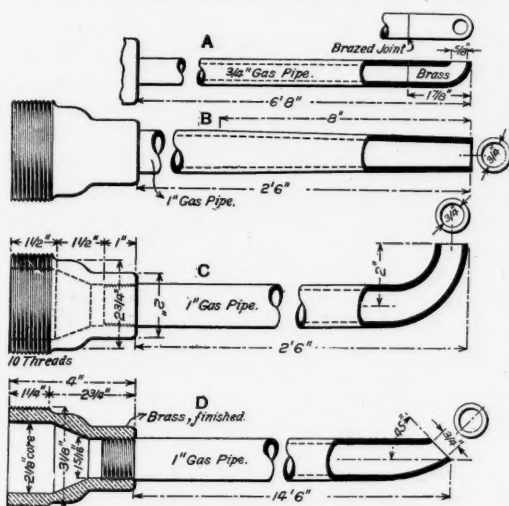
give the plan now under construction for the Lake Shore and Rock Island Companies on their elevated tracks. In both cases, the troughs act as cross-beams and the rails as longitudinal beams in distributing weight.

If we know what proportion of the wheel load is carried by each trough we can calculate the strains and deflections by the usual methods for beams.

The calculations of the author have here been omitted. The comparisons made, which are based upon the results of these calculations, are as follows: The shallow floor distributes its loading very widely, reducing the strains, and thus conducing to economy. It is, however, less stiff under trains, and may become loose in rivet connections from excessive deflections. Still its elasticity is an advantage as a cushion and it gives excellent results in practice. The deeper floor concentrates its loading making the structure heavier but stiffer. Both floors are strengthened by an increase in the stiffness of the rail, causing wider distribution of the load. Both designs are well within ordinary limits of strain, the deeper one having the smaller stresses. For very shallow floors and heavy loads it will not cost much more than the usual floor beam and stringer construction with the same unit strains.

Nozzles for Washing Out Boilers.

We show herewith some special nozzles used on the Chicago, Milwaukee & St. Paul for washing out locomotive boilers. It is well-known that with the nozzles generally used for this purpose, the boilers seldom or never are thoroughly washed, because certain parts are



Nozzles for Washing Boilers.

inaccessible from the holes provided. These nozzles are used by attaching hose to the water system in the round-house at Milwaukee, where hot water at 100 pounds pressure is obtained. They are of various shapes and suited to different locations, as may be seen by reference to the illustrations.

Style A is used for washing the crown sheet from the plugs in the back head. Style B, is used for the same purpose and cleans easily the accessible parts. It is used also for straight parts from the leg of the fire-box, using the washout plugs at the bottom corners. Style C is used for the less accessible parts around the back door

sheet, while style D is used for washout plugs in the front end.

The illustrations show the construction of the nozzles and the fitting by which they are connected to the hose.

Elliot Frogs and Switches.

The Elliot Frog & Switch Co., of East St. Louis, Ill., exhibited at the Roadmasters' Convention several devices

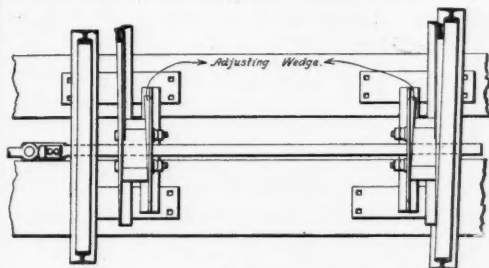


Fig. 1.

of more or less novelty. In Figure 1 is shown a plan, and Figure 2 is an enlarged detail, showing their method of correcting the gage of a split switch. The adjusting wedges cannot slip from their proper position, as the

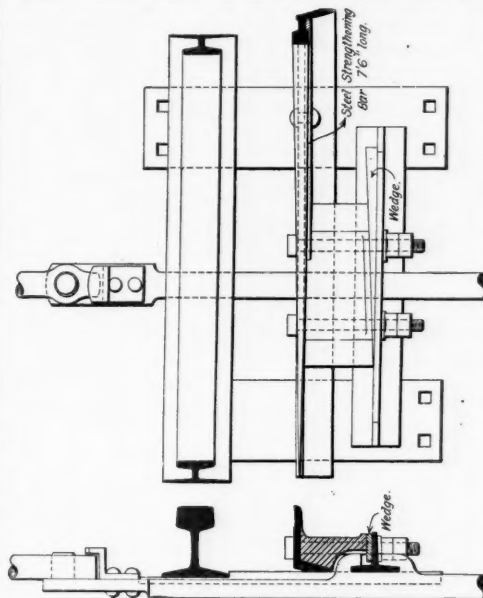
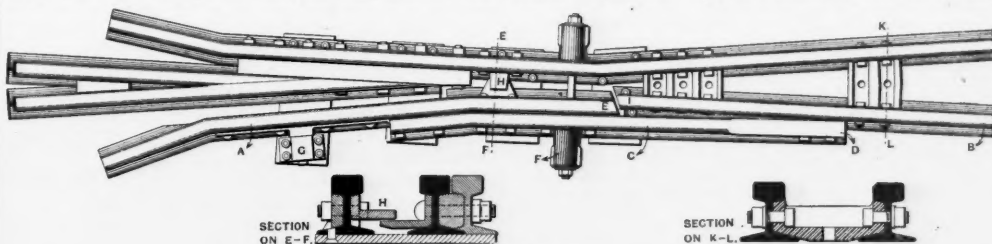


Fig. 2.—Elliot Split Switch Adjustment.

securing bolts pass through holes, and not slots, in them. The number of bolt holes in the wedges allows sufficient change in position to properly adjust the gage of the switch.

In the spring rail frog the Elliot Company has divided at E, I, the usual length of movable rail, A to B. The



Elliot Spring Rail Frog.

part from I to B is secured rigidly in place; and to this rail, at D, is hinged the bar or rail C, which is simply to carry and guide the moveable part A-E of the frog. The usual spring housing is shown at F, and the guides at G and H. By this construction the distance over which a train, moving on the main track, rides upon a loose rail, is only from the frog point to E instead of to B, and the liability to spread is reduced.

The Heilmann Locomotive.

The Western Railroad of France, in conjunction with the Heilmann Traction Syndicate, is building two locomotives of the Heilmann type, but improved somewhat upon the experimental one concerning which we have published particulars before. The new engines are for the seaside express traffic between Paris and Trouville, and it is proposed that they shall make an average speed of about 62 miles an hour. They are building under the direction of M. Mazen, Locomotive Superintendent of the company, and the electrical machinery is building by Messrs. Brown, Boveri & Co., of Baden, which firm supplied the electrical parts of the first locomotive.

The new locomotives will weigh from 110 to 120 tons in working order, and will have two 8-wheel bogie trucks and eight motors, one truck to carry the boiler and the other the engine and dynamo. A writer in *Engineering* gives a few further particulars of the new engines.

Instead of the Lentz boiler, as the old one had, they

will have ordinary locomotive boilers. Instead of the horizontal, 800-horse-power engine used before, each of the new locomotives will have a 1,500-horse-power, Willans vertical engine, and the dynamos will have a correspondingly increased power. Thus, with equal weight, the new locomotives will develop nearly twice the horsepower of the old one. In the first locomotive the armature on each motor was mounted and revolved on a hollow steel shaft or tube, keyed to the wheel axle. This arrangement, while efficient up to 40 miles an hour, was inconvenient at higher speed. In the new locomotives the hollow steel shaft will be independent of the wheel axle, and will transmit the motion direct to the wheels by means of elastic coupling.

Some Recent English Cars.

The competition for the tourist travel from London and the south of England to Scotland has led to important improvement in the accommodation for passengers. Last year, as our readers must know very well, the great lines running from London to Edinburgh and Glasgow, astonished the British public by putting on third-class dining cars which have been very popular and successful.

This year the East Coast route, namely, the Great Northern and the North Eastern and North British, put on eight new corridor sleeping cars and a new third-class dining-car of greater size and seating capacity than those used heretofore. These corridor sleeping cars are designed to give the through communication of American cars and the privacy of English cars. The corridor runs the whole length of one side of the car. There are two doors opening into it from without, these being each about one-third of the length of the car from the end; and from each of these doors a passage leads directly across to the other side of the car, where are also doors for entrance and exit. From these passages doors open into the compartments, of which there are four, and each compartment contains two berths, giving therefore eight berths in the car. These berths run parallel to the sides of the car, there being a gangway between them, and at the end of the gangway is a seat. The berths are provided with curtains as in the American sleepers. At each end of the main corridor is a lavatory; and it will be seen that one can go and come without disturbing any of the passengers except the other occupant of his compartment.

Four of these cars were built by the Lancaster Carriage Co., and the others at the Doncaster shops of the Great Northern. The contract-built cars are 47 ft. long over all, the others 37 ft. 6 in. The contract cars have two 4-wheel bogie trucks, the others six wheels and radial axles. Each of the cars has a compartment for the attendant and in this compartment are a stove and the necessary arrangements for making tea, and there is electric connection from each berth to the attendant's compartment. In order that two cars may be served by one attendant they are connected by vestibules and the electric communication from the berths of each car extended to the attendant's compartment in the other car.

The new dining car of the East Coast route has two 4-wheel bogie trucks and a clerestory roof in which are ventilating sashes. This is a radical innovation in Eng-

lish practice. This car is 52 ft. 6 in. long, 9 ft. wide over all, and weighs 26 long tons. It seats 42 passengers and is divided into three compartments, one containing 18 seats and the other two 12 seats each. The arrangement of seats is that which has been described before for the cars running in this service; that is, the seats are wide enough to place two persons on one side of the aisle and one on the other. These cars have end doors and vestibules, connecting them with the adjoining car. They are lighted by Pope's oil gas system and heated by steam from the engine. The sleeping cars are heated by hot water pipes from the stove in the attendant's compartment.

Limits of Accuracy of Steam Engine Indicators.

Professor D. S. Jacobus, of Stevens Institute of Technology, has made a most searching examination of the errors that may arise in taking measurements with steam engine indicators. The result of his investigation should be in the hands of every one who expects to use the indicator for the measurement of power. A complete statement of the work is given in a pamphlet reprinted from the *Stevens Indicator* for April, 1894, and having the title "Errors of Measurements of Power by the Steam Engine Indicator." Most of the results will appear in Volume XV. of the *Transactions of the American Society of Mechanical Engineers*. For the benefit of those who may find it difficult to get the complete report, we give here certain general results reached by Professor Jacobus.

All accurate tests require the indicator springs to be previously tested to determine the scale. The examination should be made with steam, air or water, according to whether the tests to be made are on steam engines, air compressors or water pumps.

The actual scales of pressures determined by testing the springs often differ considerably from the scale marked on the springs as received from the makers. In many cases this variation is as high as five per cent. Some very careful tests with four indicators on a steam cylinder showed the results to agree within two per cent. after all corrections were made for differences in the scales of the springs, but so close an agreement is not to be expected except for indicators in correct adjustment, in which there is but little friction. The friction of an indicator piston should be so small that there will not be over the thickness of a very fine pencil line between the lines obtained for the same pressure, while the pencil is rising, and while falling. The test can be made by pressing down or up on the piston when the steam pressure is on and releasing it slowly and then pulling the indicator cord to make a line on the card. A leaky piston is much more reliable than one that has too tight a fit. A piston that will fall through the cylinder by its own weight may be too tight and produce errors incident to undue friction. A correctly fitted piston may be thrown out of line by the action of the spring and thus produce excessive friction. It has not been found that errors may result from the "lag" of the spring. If a difference is found between the readings, taken for the same steam pressure, when the piston of the indicator is pushed down and up, and allowed to come to rest gradually, the cause should be searched out and eliminated, as the friction which causes this difference may induce errors in the power measurements.

The tests showed that the variation of the weight of the moving parts, within the limits now employed by makers of standard instruments, does not effect the accuracy of the results obtained with indicators. A test made with the mechanism heavier than that in any of the current makes of indicators did not introduce an error.

For accurate work it will be found that the indicator spring varies in scale for different heights of the diagram, and for very close work it is necessary to employ the scale corresponding to each portion of the diagram. There may be an error involved in employing scales determined in any particular range of pressure. Thus in the four indicators that were tested, if the scales had been determined over a range of 100 lbs. above the atmosphere, or about 20 lbs. greater than the initial pressure, the error of so doing would have been as a maximum three per cent. or, adding opposite signs, five per cent. If the range had been from the atmosphere to the initial pressure, the error would have been as a maximum about one per cent., or, adding opposite signs, two per cent. If the scales had been determined between the mean forward and mean back pressure, the error would have been only one per cent. at a maximum, but this small variation is exceptional and cases are often met in which the error is greater than this amount. For exceedingly nice work Professor Jacobus gives a method for finding the true average scale to use for the entire card. There are a number of tables giving the results in detail as well as a description of the tests. The cuts of indicator cards, taken with the pistons of several indicators in different conditions as to tightness, weight, etc., are very instructive, as they show graphically the results that may be expected when an indicator is not in the proper condition. A method is given of measuring mean effective pressure with a planimeter and a plan for testing the accuracy of this instrument, by causing the tracing point to revolve in a circle, in which it is guided by means of a radius bar; these tests are made with several sizes of circles.

Foreign Railroad Notes.

The whole number of locomotives constructed and submitted to the official tests in Austria during the year 1893 was 132, of which 50 were turned out at the Wiener-Neustadt Works, 40 at the Florisdorf Works, 29 at the works of the Austro-Hungarian State Railroad Co., and 13 from the works of Kraus & Co., at Linz.

Siemens & Halske, supported financially by the Anglo-Bank, have submitted to the Austrian Ministry of Commerce a project for an electrical underground railroad in the city of Vienna. The plan is to have a flat-topped tunnel immediately under the pavement, and not deep in the soil, the height underneath the deck to be only 8 ft. 10 in. The current is to pass over the cars and the return current through the rails. The cars are to seat 40 passengers, with doors automatically locked when in motion, while the train cannot be started till the doors are closed. The machinery is on the top of the car. The project is for a double track road of standard gage. The speed promised is nearly three times as great as that of the existing street railroad.

The lines of the Southwestern Railroad Co., of Russia, a little more than 2,000 miles in the best wheat-growing country and leading to Odessa, the chief Black Sea port, are to pass into the hands of the State at the beginning of next year. It appears to be the policy of the Russian Government to get into its own hands all the railroads east of Moscow, which are those most important strategically; and this acquisition will leave only about 1,300 miles of private road in that territory. There is a rumor, how-

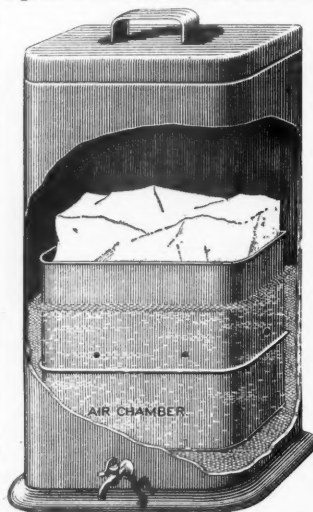
ever, that the State will retain and work only that part of the Southwestern's lines which are east of the Dnieper, and will rent the others to a company to be formed for the purpose.

It has been determined to build a railroad from Wologda, about 300 miles north of Moscow, and the present terminus of a railroad, nearly due north 400 miles to Archangel, at the mouth of the Dwina on the White Sea, and the most important of the Arctic ports. It is but little below the 65th parallel of latitude, and as far north as the northern end of Hudson's Bay.

For some years the Dutch Sunday Rest Society has urged upon the Government a change in railroad regulations which would relieve the employees from much of the Sunday work. Last January the changes were made in such a way that the railroad companies are not required to receive, collect, deliver or ship freight on Sundays or holidays; while these days are not to be counted in the time within which goods must be delivered, or cars loaded or unloaded by shippers or consignees. In consequence of this, since June last the Dutch railroads have closed their freight offices and ceased running freight trains on Sunday.

Major's Ice Float.

The accompanying illustration will give a fair idea of an arrangement for carrying the ice in a car or station water-cooler, which has already come into use. It consists of a galvanized iron pan made in two compartments, the lower compartment being made air tight, forming an air chamber or float. The upper compartment is used as a guide for the air chamber and a receptacle for the ice.



The air chamber is about 3 in. deep and the ice pan about 4 in. deep. The space between the sides of the pan and the inside walls of the cooler is about $\frac{1}{2}$ in. of an inch, allowing for the free circulation of the water about the pan. Several holes in the ice compartment made at regular intervals, about an eighth of an inch above the air chamber, allow the free flow of water from the melted ice; as the ice melts, the float and pan gradually rise, until the ice is entirely free from contact with the water. From this fact, in connection with the low temperature of the now dead air in the cooler, it is claimed that a saving of from 33 per cent. to 50 per cent. of the ice results; while the perforations in the ice pan permit the steady outflow of water from the ice, keeping the water in the cooler at a nearly uniform springwater temperature, considerably above the freezing point. The hygienic aspect of this device appears to be of value, because the temperature of the water drawn from the ordinary cooler, where the ice comes continually in contact with the water, frequently approaches within a few degrees of the freezing point; whereas by the use of the float, the temperature of the water in the cooler ranges from 44 degrees to 48 degrees, that in the ice pan being 36 degrees. The float prevents a constant washing over the ice by the water, which causes it to melt rapidly—always the case on railroad cars when the train is in motion. It also in a large measure prevents slopping over, a very frequent cause of annoyance and nastiness. It is made by A. Major, 232 William street, New York.

Electricity in the Modern City.

The *Journal of the Franklin Institute* has published a lecture before the Institute, by Mr. T. C. Martin, editor of the *Electrical Engineer*, under the title of "Electricity in the Modern City." We give a few extracts.

We all talk about the telegraph as though it were something of such terrific importance to us that nothing short of a big Government monopoly would give us all of it that we want. The bitter complaint of a friend of mine up town in New York, that the nearest telegraph office to his house was three blocks away, set me investigating. On inquiry, I found that the local Western Union offices in New York city exchanged among themselves the wonderful total of 700,000 messages last year, or, even upon the basis of Mr. Porter's belittling census, barely one per year for every two inhabitants. The average for the whole United States is about one message per year per head. The local tariff of 20 cents per message can hardly be regarded as severe, since it about equals the car fares that would be paid if one carried one's own message and returned; so that as regards the inner social life of a modern city the telegraph is not the vital necessity it has become between points widely apart. The statistics from Europe, where social telegrams, among denser populations are more numerous, bear out this idea, and I do not know that we shall ever see much of a change. Mr. Wanamaker has shrewdly suggested making postoffices a receiving place for telegrams, but I doubt seriously whether that would markedly stimulate local telegraph business. In fact, telegraphing is not a universal boon to

individual citizens. The telegraph ratios, under our free institutions, with more or less of private competition, vary very slightly from those of monarchical Europe with Government systems, so that we may infer from them that there are strict limitations on the social use of the telegraph wires. Happy the nation, it is said, that is not making history; happy, say I, the countryman who is under no necessity to send or receive a telegram.

Moreover, there are two other electrical agencies, which, by their superior utility, act as a great check upon the local telegraph service, namely, the district messenger and the telephone. Both of these forms of communication are important. I am not among those who believe the district messenger boy to have been created for the sole benefit of the alleged comic paper. The slowness of the messenger boy has become as tiresome a joke as the extortion of the plumber, or the sleepiness of the Philadelphian; and we all know how foolish and empty these witticisms are. It is very easy to find out what the average district messenger boy accomplishes with the help of the electric system that brings his services into play. In New York, the messenger business of the district telegraph companies requires the services of 1,200 boys, and the number of errands performed by those boys last year was 2,600,000, or, for each boy, not less than six a day every day in the year rain or shine, well or sick, Sundays and holidays. If you think that is not good work, apply the same average to your own office boy, and see where he comes out. Please remember these figures when the little chap in uniform comes around to see you at New Year.

The telephone is pre-eminently an instrument for local use. Its special utility is derived from the fact that it is practically instantaneous, affording usually an immediate response to the message. Besides, it is absurdly cheap to any one who has a real necessity for such quick intercommunication. The telephone exchange in this city, over which my friend Dr. Plush so ably presides, handles daily nearly 30,000 telephonic connections, that costs each subscriber less than 5 cents per talk; while each subscriber has also the opportunity of reaching out to New York, Washington, Baltimore, Boston, Pittsburgh, Buffalo, and even Chicago. Are there any in my audience who will say that their talk over the telephone each time they use it is not worth 5 cents? Obviously, the telegraph in the city is under serious disadvantages from competition, and I do not see how it can reduce its charges to an equality with those of the telephone, for, cheap as the telephone is, there is a possibility that, with improvements in methods, the running out of patents with royalties, and the increased use, telephonic service may gradually become cheaper. Last year, I may add, the urban population of this country sent 500,000,000 telephone messages, or ten times as many uses of the telephone as of the telegraph.

It is only when we come to examine the figures that we realize how little has been done towards the universal adoption of electricity for our homes and offices. The dynamo capacity of the United States to-day for supplying current to incandescent lamps is about 5,000,000 lights, and the number of lights wired up is about 7,000,000 or 8,000,000. The production of incandescent lamps runs about 25,000 to 30,000 a working day all the year round, making a rough total of 8,000,000 to 9,000,000 lamps manufactured for consumption. As the average life of a lamp is about 800 hours, and the average use is about two hours daily, we will see that lamp production and lamp consumption pretty fairly balance. But the total result is, to say the least disappointing. It is a reasonable assumption, supported by various figures, that there are two gas burners per head of population in our cities; I believe gas consumption is often broadly estimated at about one active burner per head. Hence, it would follow that New York and Philadelphia to-day, if gas were abandoned or used as power at the point of production and electricity were universally adopted in its stead, would at once need all the dynamos and lamps now made and used for supplying the whole of the United States. And yet the combined population of the two cities barely reaches 3,000,000, or less than one-twentieth of the population of the country. The same basis of calculation would give us, for the United States, a dynamo lighting capacity of 100,000,000 incandescent lights and a lamp production of 600,000 lamps a day. If we cut that in two, so as to consider merely city population, there still remains an enormous field that has yet to be occupied.

Now, I do not think I overstate the case when I say that everybody in American cities would like to use the incandescent light, if possible. What then, have been the reasons that have so far stood in the way of gratifying their desires? Three reasons, I should answer. First, the high price of current; next, the scarcity of the supply; and third, the cost of the lamps. The first two reasons merge into each other. Stations are in reality still producing on a retail scale, in view of the area to be supplied. We shall steadily proceed to equalize things by increasing the quantity of current we manufacture. We have a great variety of apparatus that is increasing the demand for current, and thus cheapening the supply. I refer chiefly to electric motor and to electric heaters. The introduction of these appliances means much to a central station, and therefore much to the public. The chief hours of lighting are usually limited between 5 p. m. and 12 midnight, with a maximum of only half that time. Gas works have been able to depend on the daytime use of gas for gas engines and for cooking and warming; but until lately central stations have had no corresponding day load, and they have been at a corresponding disadvantage as to opportunities of income and profit. But now the use of electric motors and electric heaters is changing all that. It is no uncommon thing for a central station to-day to supply current for hundreds of motors employed in an endless variety of work.

Mr. Martin next took up the topic of electric railroads. Five years ago the electric street railroad was practically unknown in America. He compiled the first statistics of the industry in 1887, showing a baker's dozen of short experimental roads. Four years ago he sat in a street railroad convention of the National Association and heard an indignant delegate complain that he was there to learn how to shoe horses and dispose of manure, certainly not to listen to this new fangled stuff about electricity. Naturally, the swift development of the industry has been accompanied by mistakes and has encountered great prejudices and opposition, but it is one of the striking instances of the way in which the visionary schemes of the inventor soon become the solid realization of the public. For the great majority of our cities and towns, electricity becomes the sole means by which they can enjoy that which counts for so much in the sum of comfort and convenience, swift, cheap, frequent and profitable transportation.

The lecturer then developed at some length the theme of the immense social importance of cheap and quick transportation for people to and from the centers of the great cities. Not only do electric roads stimulate and vivify city life, but they level up values and distribute

prosperity. It is not at all an infrequent thing to see the adoption of electricity doubling and trebling the traffic of a street railroad, and the permanent addition of 30 per cent. is now taken as an absolutely safe minimum.

The danger from the overhead conductor has become one of the bugbears which all new enterprises are liable to encounter. As a matter of fact electric cars have in this country carried more passengers than would equal the entire population of the globe, and in not a single instance has a passenger been killed or injured by the current. The economy of this method of transportation is illustrated by the experience of the Rochester Street Railway for June, 1891, showing earnings of 22.77 cents per electric car mile and expenses 11.07, while their horse cars had earned 14.37 cents and cost 12.06. In other words, the net earnings per mile had increased from 3.31 to 11.7.

American Railroad Bonds as Investments.

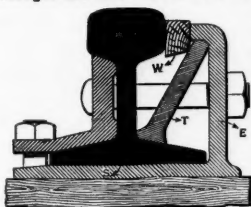
Upon investigation we found recently that American railway shares as a class had proved most unsatisfactory investments. A very different record, however, is found when we turn to the bonds issued by the American railway companies. Here, as in the case of the shares, it is difficult to make anything like an exhaustive comparison with the figures of ten years ago; but, nevertheless, it is not difficult to prove that English investments in American railway bonds have yielded, on the whole, most satisfactory results. It may be well to give the following figures, which show how the prices of, and the yields on, a number of representative issues contrast with 1884:

	Prices.			Yield.	
	Now	1884	Rise or Fall	Now	1884
Allegheny Valley, 1910.....	132	128	+ 4	4 7/8	5 1/2
Baltimore & Ohio 6s, 1910.....	122	122	—	4 1/2	4 1/2
Balto. & Potomac (Main line).....	122	116	+ 4	4 1/2	5
Canada Southern 1st Mortgage.....	110	98	+ 12	4 1/2	5 1/2
Central Pacific 1st Mortgage.....	105	114	— 9	4 1/2	4 1/2
Chicago & Alton 6s, 1903.....	117	118	— 1	3 1/2	4 1/2
Chicago & N. West 5s.....	113	97	+ 16	4 1/2	5 1/2
Chicago & W. Indiana, 1932.....	119	104	+ 15	4 1/2	5 1/2
Chicago, Burlington & Quincy 5s.....	108	107	+ 1	4 1/2	4 1/2
Chicago, Milwaukee & St. Paul (Chicago & Pacific Western).....	113	97	+ 16	4 1/2	5
Galveston, Harrisburg & San Antonio 6s.....	100	109	— 9	6	5 1/2
Illinois Central 5s, 1905.....	112	107	+ 5	3 1/2	4 1/2
Lehigh Valley 6s, 1923.....	120	123	— 3	4 1/2	5
Louisville & Nashville 6s, 1930.....	119	94	+ 15	4 1/2	5 1/2
New York Central 7s, 1903.....	128	135	— 7	3 1/2	5 1/2
New York, L. E. & West. 1st Cons., 1920.....	135	130	+ 5	4 1/2	5 1/2
Norfolk & Western 6s, 1931.....	120	105	+ 15	4 1/2	5 1/2
Northern Pacific 6s 1st Mort.....	114	102	+ 12	5 1/2	5 1/2
Pennsylvania Railroad 6s, 1910.....	127	123	+ 4	3 1/2	4 1/2
Pennsylvania Co. 4 1/2s, 1921.....	113	98	+ 15	3 1/2	4 1/2
Pittsburgh & Connellsville 6s.....	129	121	+ 8	4 1/2	4 1/2
Philadelphia & Reading 6s 1st Mort.....	124	118	+ 6	4 1/2	4 1/2
St. Louis Bridge 7s 1st Mort.....	132	125	+ 7	5 1/2	5 1/2
Southern Pacific 6s 1st Mort.....	113	107	+ 6	5 1/2	5 1/2
Union Pacific 6s 1st Mort.....	107	116	— 9	—	—
United of New Jersey 6s, 1901.....	117	122	— 5	3 1/2	4 1/2

It will be seen that prices generally have advanced, and that in many cases the gain is very considerable. The appreciation, however, becomes the more noticeable when allowance is made for the fact that naturally the value of redeemable bonds standing at a premium, diminishes year by year, and also that during the past decade the position of nearly all American railway companies has steadily deteriorated. Instances might be multiplied, but a few may suffice, perhaps, to draw attention to the sphere for profitable investment which New York supplies, and which is really not much less easy of access than London itself. In modern conditions Wall street, the Place de la Bourse, and Throgmorton street are not far apart.—*The Economist (London).*

Rail Joints.

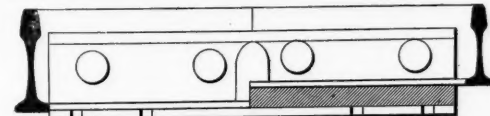
We show a couple of the rail joints which were exhibited at the last convention of the American Roadmasters' Association, in New York.



The Niles Rail Joint.

has been before the railroad public and in considerable use for a good while. The base plate is the most important

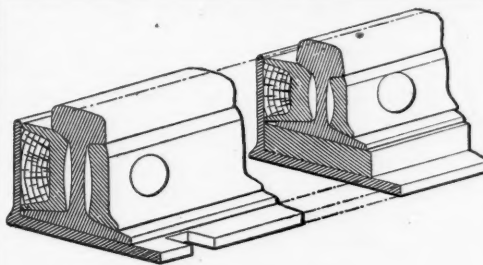
The newest one is the Weber Step Joint, which shows the ready adaptability of the well-known Weber joint, to use where rails of different heights are to be joined. It is not necessary to describe the joint, for it is well shown in the illustrations, and moreover



Weber's Step Joint.

tant special feature of the joint, and in the adaptation shown here it will be seen that a packing piece is put under the lower rail and resting on the base rail, and that the fish plate inside is a special one rolled to fit the two different rails. This joint has done good service where it has been used heretofore, and in this special adaptation we should suppose it would be a particularly useful one.

The Niles Joint, which is also shown, has been mentioned both favorably and unfavorably by committees of the Roadmasters' Association. Its construction is shown



in the section. It hardly meets the fundamental requirements laid down by the Association's last committee, of simplicity in parts, and we should question its acceptability to most maintenance-of-way men. The wooden filler is used merely to keep gravel or other material from filling the space inside the joint.

TECHNICAL.

Manufacturing and Business.

The Directors of the Union Switch & Signal Co., have declared a dividend of 1 1/2 per cent. on the preferred stock, payable October 15.

F. A. Lester & Co., Monadnock Block, Chicago, will hereafter act as western agents of the Ajax Metal Co., of Philadelphia, representing it in all its products.

The Alletton Lubricant Co., has been formed, with offices in Chicago, by W. M. White, H. G. Chamberlain, and C. W. Martin.

The Cleveland Twist Drill Co. reports that it has had a very heavy business for a considerable time past. Its present plant has become too small, and it proposes the erection of a large addition before the end of the year.

The Heath Rail Joint Co. now has its new plant at South Chicago in operation, having started up on Oct. 1. The company reports among its recent orders one from the Atchison, Topeka and Santa Fé for joints for 75 miles of track.

The American Bridge & Iron Co., of Roanoke, Va., whose plant has been closed, has resumed on four important contracts for bridge work.

The Buchanan Bridge Co., of Bellefontaine, O., has secured an amendment to its State charter authorizing a change of the name to the Bellefontaine Bridge and Iron Co.

The American Steel Castings Co. is to start up the Bessemer department of its works at Alliance, O., formerly the Solid Steel Co., employing 100 men. The Alliance plant has been idle nearly four months. Superintendent John N. Maher states that there is good prospect that the plant will be operated continuously. The work is started with pressing orders for nearly a month's work on hand.

The Paterson Handle Works, of Paterson, N. J., is calling attention to the fact that it has gone extensively into the manufacture of handles and mallets of every description. The company also makes a specialty of boiler makers' mauls, tin and coppersmiths' mallets, all sizes, and car and truck poles.

Iron and Steel.

Work in the rolling department of the New Jersey Steel & Iron Co. has been resumed after being closed down for four months. The only department that has been running with the usual force is the bridge works, and there the force has not been enlarged.

Mr. Thomas J. Price has been appointed General Superintendent of the Mahoning Rolling Mill, Foundry, & Machine Shops, and also of the National Structural Tube Co., of Danville, Pa., vice William C. Frick, resigned.

On Oct. 10, the converting rail and blowing mills in the north plant of the Lackawanna Iron & Steel Co., at Scranton, Pa., started up on double turn.

Car Lighting.

For some time the Pintsch gas plant, at Ogden, Utah, owned by the Rio Grande Western Railway, has been taxed to its utmost, and it has been decided to double its capacity. The necessary apparatus has already been received at Ogden, and the work of installing will be commenced immediately. In addition to supplying the coaches of the Rio Grande Western, gas is also furnished to those of the Union Pacific and Southern Pacific.

Pennsylvania Steel Co.

The stockholders of the Pennsylvania Steel Co. held their annual meeting in Philadelphia last week. The members of the Reorganization Committee were elected temporary Directors until such a time as reorganization shall have been effected. The new directorate is composed of Effingham B. Morris, John B. Gest, N. Parker Shortridge, George Philler, Howland Davis, Alfred Earnshaw and Major Luther S. Bent, one of the Receivers, and the former President of the company. The report of the Receivers showed that the results of the operation of the Pennsylvania and Maryland plants for a year gave a profit of \$150,000. Owing to the coal and coke strikes the output for the year has been cut down one-half. The Receivers had also been embarrassed by a few attachments in other States, which prevented them safely ship-

ping goods, and in that manner the volume of business was also cut down. These attachments, the report said, had all been defended and were likely to be removed. In regard to the reorganization which is now in progress, it was reported that 94 per cent. of the creditors had signed the reorganization agreement, and practically all the stockholders. The new issue of preferred stock had been over subscribed to the amount of \$250,000 beyond the required amount of \$1,500,000.

The Chamber of Commerce and Rapid Transit.

At a meeting of the Chamber of Commerce of New York City, held Oct. 4, a resolution was passed, approving of the construction of a rapid transit railroad in New York at the public's expense, and inviting citizens to unite with the Chamber in an effort to secure a vote of the people in favor of the project.

Lighting of Brooklyn Bridge Cars.

At a recent meeting of the Trustees of the New York Brooklyn Bridge it was voted to advertise for bids for lighting the bridge cars by electricity. Bids had already been submitted by two companies and Mr. C. C. Martin, Chief Engineer and Superintendent of the bridge, recommended that the contract be awarded to the lower bidder, the Electrical & Mechanical Engineering & Trading Co., of New York. Vice-President Skinner, who is in favor of using Pintsch gas, objected to the Board taking any action in the matter until bids had been advertised for, and was sustained. The following are the estimates which had already been furnished:

Gen. Elec. Co., installation complete.....\$15,900
Elec. & Mech. E. & T. Co., installation complete.....14,414

The estimated cost of the light per year is:

General Electric Co. \$6,477
Or 53 cents per car hour.
Elec. & Mech. E. & T. Co. 3,409
Or 28 cents per car hour.

As both of these estimates include interest at 5 per cent. on the cost of the plant and depreciation at 6 per cent., they would be modified by the revised estimates of the cost, and would become:

General Electrical Co. \$6,664
Elec. & Mech. E. & T. Co. 3,124

At a previous meeting of the Bridge Trustees a bid was presented by the General Electric Co., in which the total was over \$3,000 less than that of their competitor; but as the Electrical & Mechanical Engineering & Trading Co., included placing trolley wires over the entire tracks in the Brooklyn car storage yards, and building the engine and dynamo foundations, Mr. Martin had the former company revise its proposition to conform with these items. The result was as above. Mr. Martin also had specified direct connected dynamos and engines.

Shot and Armor.

Some trials have recently been made at the Indian Head Proving grounds of cast steel projectiles made by J. G. Johnson & Co., Spuyten Duyvil, New York. Four shots were fired; each 10 in. in diameter. The first three shots were fired at an 18-in. nickel-steel, harveyized plate, which had been damaged somewhat by Carpenter and Wheeler-Sterling projectiles. These three shots weighed respectively from 494 to 502 lbs., were fired with 250 lbs. of powder at a striking velocity of 1,983 ft., or thereabouts, and a striking energy of 13,650 foot tons. The first shot was broken up, but the plate was seriously damaged. All of the old cracks were widened and a new through crack developed. The second shot also broke up, but made a through crack one inch wide at the shot hole and a fine crack extending nearly to the top of the plate. The third shot penetrated the plate 15 1/2 in., the point remaining in the hole, the body of the shell breaking off. This developed a new through crack and widened the old ones. The fourth shot was fired against a 17-in. harveyized, nickel-steel plate, which had been previously attacked by four 12-in. shells. The shot went about 20 in. into the plate and backing, the base sticking out 8 in. from the face of the plate. All the old cracks in the plate were widened, and a new one, extending to the top of the plate, was developed. The whole of the principal portion of the plate, though remaining on the backing, was badly wrecked. The officer in charge of the firing reports that "the performance of these shots, when compared with the 12-in. armor piercing shell previously fired against these plates with a striking energy 1 1/2 times greater, cannot fail to bring to notice the superior quality of this particular shot, leaving but little to be desired as far as solid shot are concerned."

Simplon Tunnel.

The Swiss Parliament has approved the project for the Simplon Tunnel. The experts, Messrs. Colombo, of Milan; F. Fox, of London, and C. S. Wagner, of Vienna, approve of the plans submitted except with regard to some of the proposed arrangements for ventilation. They consider the estimate of cost adequate. The question of ventilation is, we judge, considered difficult only during construction, for it is said that natural ventilation during operation will be enough for a traffic up to 12 passenger trains and 30 freight trains a day without the use of special locomotives. Nevertheless, the use of electric locomotives is recommended, especially as the water power available will make electricity economical.

The Pittsburg-Lake Erie Canal.

Last Tuesday the Provisional Ship Canal Committee, of Pittsburgh, Pa., decided to open subscription books for a guarantee fund, not to exceed \$100,000, to cover the cost of preliminary surveys, of procuring a charter, forming an organization and other necessary preliminary expenses.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contract for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The Massachusetts railroad commissioners have appointed three railroad inspectors, at \$1,500 a year each, under a law passed last June. The inspectors have power, under the direction of the commissioners, to examine tracks, machinery, cars and locomotives; and one of them is required to attend inquests held in cases of "death by accident upon a railroad." The bill provides that any railroad employee may complain in writing to the railroad commissioners of "defective ways and machinery" and his name shall not be divulged. If we remember correctly, this law was passed to please the "labor" vote, on the plea, more or less clearly avowed, that the safety of trainmen needed to be more carefully looked after, and on the tacit understanding, no doubt, that three "laborers" needed jobs as inspectors. But the commissioners are conservative, and they have probably tried to get the fittest men they could find at the salary stipulated by the law, and it may be that the promoters of the law builded better than they knew. Massachusetts can now rank herself with Great Britain, so far as names go; but the new inspectors get less than half the salary paid to the experienced and highly trained engineers who perform these offices for the British Board of Trade and the British inspectors are, more over, half-pay officers of the Royal Engineers, with all that a place in that corps implies; so there is small chance of having the independence, integrity and good judgment which are so manifest in the work of these British officers. If the new appointees are "average" fifteen-hundred-dollar men they will not add much to the value of the commissioners' work; while if they are worth more than their salaries the state will not be able to keep them long. But we wish them well; Massachusetts has thus far exercised the function of railroad regulation better, on the whole, than any other state, and now her commissioners have a chance to make a further advance. They can make good use of more detailed knowledge of the railroads, if that knowledge is gathered by discreet men, and the main responsibility still rests upon the Board; for, if we read the law aright, the inspectors' work is subject to revision by the Board.

The fall meeting of the American Railway Association comes next Wednesday and there will probably be a good attendance, but from the reports thus far issued by the Committees it does not appear likely that we shall have a continuation of the lively discussions that took place at the last meeting. The joint committee has made a few alterations in its code of regulations for the construction and operation of block signals, making them more colorless—as, in the present conditions, they should be. (We do not refer to the fact that fewer signal-colors are mentioned, but to the elimination of disputed points.) There is no immediate need of action on the debatable questions that have so puzzled the committee, while there is a definite opportunity to do good by establishing an authoritative code of regulations touching those features of signaling on which all the best roads are substantially agreed. The most interesting committee report to be presented is that on regulations for employees. This committee hands in

an elaborate supplementary code containing rules for employees connected with trains, touching all subjects outside the standard code on which general rules should be issued to these classes. This is an important and valuable work. There are 321 rules, equal to 63 pages of the size of those in the authorized edition of the standard code, and they bear evidence of having been compiled with great care. The committee does not vouch for the rules, but only presents them for discussion. Doubtless this, is well, for superintendents with variant views on minor points can find subjects for disagreement on nearly every page; nevertheless the proposed code is really very near the highest attainable degree of perfection. Such a code cannot be perfect; it cannot approach so near perfection as does the standard code; but, like the latter, it has a high value as a standard of language. It was necessary to either condense severely (as was done in the Pennsylvania code) or take up details very fully. The latter course was chosen, and, so far as we can judge by a cursory examination, with great success. Fullness and all reasonable brevity are well combined, and the committee has taken the wise course of having the whole edited by one man. It is evident that this editor was a thorough railroad man, not merely a literary censor. This code embodies the three essentials of such a work; (1) systematic arrangement, (2) clear language of uniform style, and (3) sufficient fullness, so that the great bulk of the changes that individual roads will desire to make will be either omissions or such small alterations that they can be made without so mutilating the rule as to destroy its force.

We have said that the interesting discussion on signals is not likely to be resumed at the meeting of the American Railway Association; but those who wish to take it up will have a good opportunity to do so at the meeting of the Superintendents' Society, which comes two days before the larger gathering, and it is to be hoped that they will embrace the opportunity. In fact, this is the more appropriate place to have such a discussion, if only the participants would evince the lively interest that they do when they are talking upon a formal resolution which is in danger of being passed in a form they do not like. The first two topics in the list sent out by the Secretary of the Superintendents' Society, afford ample scope for the relation of every one's experience in signaling, and the relation of experience is the main thing that members desire to hear on this subject at present. The same is true of all the topics in the list, but the second topic—principles of fixed signals—probably cannot be discussed to advantage unless there is presented a carefully prepared paper as a basis. Of desultory and incomplete deliverances on this subject we have too many already. The fourth topic—How to get good employees—will demand exactly opposite treatment. "Principles and methods," warranted to work well, have been furnished in abundance; but the man who has put them in effect with conspicuous success will be heard with great interest—if he appears.

Locomotives for Export.

Probably it is safe to assume that in the future American builders of locomotives will be more active than they have been in the past in seeking foreign markets, for the reasons, among others, that the material of construction is likely to be cheaper than it has ever been before; that wages will probably be lower, and that the home market is not likely for a long time to come to be as good as it was up to two years ago; for it is not probable that the mileage of new railroads to be equipped will be as great in the immediate future as it has been in the past. If these assumptions are correct the study of foreign markets will be carried on more closely than ever, and we call the attention of locomotive builders to a long article which appears in *The Engineer* (London) of Sept. 28.

The gist of that article is that for "colonial" railroads, that is, for such railroads as are found in the Australian colonies and in South America, the American principle of locomotive building is superior to the English. This is rather a surprising admission, but we shall not dispute the reasoning which has led to it. The long distances over which freight must be hauled and the sparse population in those countries, as compared with Great Britain, approximate their conditions to those of the United States, where practical economy has led to trains relatively few and heavy as compared with English practice, where business is best served by numerous and light trains. It becomes important then to introduce heavy engines; but in these same countries it is also necessary to keep the original cost of the railroad low, which

implies light rails, light ballast and sharp curves. So the type of locomotive which distributes great weight over several driving wheels, which has flexible springs well equalized, and which provides lateral flexibility also, is obviously the best one for the local conditions, and this type is the American.

So far the American locomotive builders will doubtless agree with the writer in *The Engineer*, but perhaps they will not agree with him in his claim that the details of construction of locomotives exported from America are likely to be very faulty in design and in material and in workmanship. Unfortunately, some notorious events of the last two or three years have given him arguments which it is just as well for us not to attempt to refute, and this is the special point in his article for locomotive builders in this country to consider carefully. Doubtless he is not warranted in reasoning from a few examples, and doubtless American locomotives for export are oftener than not well designed and well built throughout, and will compare in these particulars with those exported from other countries. But a few instances of carelessness make it very hard for us to compete in the foreign markets.

The article in question gives a table of comparative data drawn from experience in the Argentine Republic, where English and American locomotives of practically the same class are compared. The table shows that the American engines gave a coal economy of from 16 to 19 per cent. and that the cost of repairs for two years was, with the English locomotives, 3.6 times as much as for the American in one case and 3.9 in another. The writer of the article which we cite does not attach much importance to the figures of repairs for he thinks that "these gentlemen (the Argentine engineers) held a brief for the Americans." Those gentlemen say that in the 60 American locomotives which they examined "the construction, notwithstanding its simplicity, is first-class, except in a few details which by no means affect their good conditions for service, and the results of working have been very satisfactory and economical." Of the English locomotives comprising the equipment of the Southern Railway they say "it may be concluded from all the data furnished in this report that the Southern Railway locomotives are but iron masses, equally injurious to the roads and the interest of the company."

The writer of the article himself says "a careful study of American engines with a few years of experience in their actual working, will soon convince the most skeptical that the principles on which they are constructed render them admirably adapted to the conditions which the colonial railways demand, and that they have many points which are immeasurably superior to the English article." He says, however, that the "many admitted advantages of the American locomotive are mitigated by the crude design of detail and the poor quality of both material and workmanship." In this lies the objection of colonial engineers to engines built in America; and further "while the principle and conception of American engines is good, the detail and execution are crude to a degree as regards those manufactured for export." He is apparently of the opinion that when the colonial buyers begin to send inspectors to the United States, or entrust inspection to some reliable house established in this country, the English builders are going to have some alarming competition. Altogether, the article is a singularly just one, and while the criticism of faults in structural detail is doubtless partial it is not good sense to shut our eyes to that portion of it which may be just.

Carrying Passengers on Freight Trains.

For many years there has been a tendency on railroads with a growing business to abolish the custom of carrying passengers on freight trains and confine all of the passenger traffic to passenger trains. This has been very persistent, so far as we have observed, and we believe it to be general and widespread. There are two obvious reasons for this—aside from certain others; first, more collisions occur among freight than among passenger trains, so that more passengers are likely to be injured; and second, the careless or dishonest conductor cannot easily be watched.

The fact that passengers are in more danger on a freight train is often made prominent by our monthly accident records, where the number of passengers killed in cabooses (including drovers and other persons in charge of freight) seems to be much larger in proportion to the total carried than it is on passenger trains.

But is it certain that this universal disposition to keep people off from freight trains is always produc-

tive of the best results? This doubt was recently expressed by an officer of a road which had abandoned this business, and, come to think of it, he has considerable ground for reconsidering his decision to give it up. It is not possible to tell how much of the business he drove to the passenger trains and how much of it was killed; but it is certain, as a general proposition, that trains at convenient hours will get passengers who would stay at home if they had to wait for a train; and there are many cases where it is pretty safe to conclude, as did this officer, that the passenger receipts on the freight trains are mostly clear gain. If a local freight train has to stop at or near every passenger station, the additional expense is too small to take account of. We know of a road where the passenger receipts of the local freight trains for a year were equal to those of the excursion trains run during the same period; but the net receipts were much larger, for the expenses of the excursion trains were not so small that they could be ignored. If, therefore, the freight accommodations are a real convenience to the public, it may well be that a larger number of valuable customers are pleased, in the long run, by this regular convenience for individuals than by the occasional attractions for crowds.

Probably the main question, therefore, is whether the freight trains can carry people safely. In the first place it is important to have the station platforms safe for convenient use to and from all kinds of cars, and to have them well lighted at night, so that passengers will not injure themselves; such injuries are more troublesome than those where the company is clearly to blame. Next, the ditches, for a good distance from the stations, each way, should also be made as favorable as possible for passengers who like to jump off in the dark, for freight trains have to make so many irregular stops that it is not easy to put a stop to this very tempting means of starting lawsuits. If freight trains are 1,500 feet long, the roadway for that distance each way from the station and for 10 feet each side of the track, ought to be as nearly level and unobstructed as possible, and suitably fenced.

Whether the freight service can be made sufficiently free from collisions and derailments to warrant the encouragement of caboose-passenger traffic, is a somewhat complicated question, but there is this much to be said; every superintendent desires to prevent these accidents, solely on the ground of expense, regardless of the element of personal injury; and his own reputation depends upon the character of his record in this matter. With these incentives it is quite likely that many superintendents are to-day running their freight trains with about as many safeguards as passenger trains enjoyed ten or fifteen years ago. The space-interval alone has greatly enhanced the safety of freight trains where it has been adopted. In one thing, however, the march of progress has perhaps been backward, as far as this problem is concerned, and that is the use of air-brakes on freight trains. If engineers are not trained to be invariably careful about taking up the slack, it very soon appears that they now have it in their power to shake up passengers in the rear car worse than they ever could do with the reverse lever alone, and the longer the train the worse the difficulty. How much weight should be given to this objection each officer has to decide for himself, in view of the character of the trains on which he would carry passengers and the kind of men he puts in charge of them.

On the whole, however, the road that is using all possible safeguards in running its freight trains may well consider carefully the wishes of its patrons before depriving them of any existing conveniences of the kind under consideration. To please them as far as possible in this direction may even save off the construction of a parallel electric street car line now and then.

Annual Reports.

Louisville & Nashville.—This company reports for the fiscal year ending June 30, 1894. The average of miles operated was 2,955.98; in the preceding year it was 2,942.03. The main results of operation are shown in the table which follows:

	1894.	1893.	Dec. p. c.
Gross earnings.....	18,974,336	22,403,639	15.3
Operating expenses.....	11,863,784	14,382,642	17.5
Net earnings.....	7,110,552	8,020,996	11.3
Income from investments..	272,288	416,109	

After deducting fixed charges and losses on leased lines, the net income for the year remains \$1,552,490. This is equal to nearly 3 per cent. on the outstanding capital stock; but no dividend was declared. In the preceding year \$2,112,000 was paid in a 4 per cent. dividend. The gross earnings were the lowest since 1890, and the net have not been so low since 1889.

The result of operations per mile is compared with the preceding year in the table below:

	1894.	1893.
Gross earnings.....	\$6,419	\$7,615
Operating expenses.....	4,013	4,889
Net earnings.....	2,405	2,726
Percentage of operating expenses..	62.53	64.20

The earnings from the various principal items for the two years are shown below:

	1894.	1893.
Freight.....	\$12,901,114	\$15,450,163
Passenger.....	4,600,961	5,213,533
Mail.....	630,931	584,126
Express.....	415,748	457,764
Miscellaneous.....	425,583	698,053

A more definite notion of the relative course of traffic for the two years may be seen from the table which follows:

	1894.	1893.	Dec. p. c.
Passengers.....	5,152,130	6,217,777	17.14
Passenger miles.....	192,098,210	211,671,216	9.25
Tons freight.....	9,433,698	12,144,580	22.32
Ton miles.....	1,398,679,019	1,595,174,080	12.32
Rate per pass. mile.....	2.35c.	2.42c.	2.89
Rate per ton mile.....	0.889c.	0.932c.	4.6
Passenger journey.....	36.1 miles	33.0 miles	
Freight haul.....	79 "	72 "	
Freight train load.....	165.38 tons	166.35 tons	

It will be observed that the average passenger journey and the average freight haul increased; that is, the passenger-miles and the ton-miles did not decline in the same proportion as the passengers and tons carried. The rates per ton-mile and per passenger-mile both fell. Of course the increase in the average passenger journey may be accounted for, as in most other cases in the last year, by the number of persons going long distances to attend the World's Fair, and by a somewhat corresponding reduction in local travel, due partly to the fact that people spent their money at the Fair. The change in the character of the freight business is probably largely due to a falling off in local traffic. It is a curious circumstance, although one that has no special significance, that the average receipt per ton per mile on the Louisville & Nashville is almost precisely the same as the average rate for the whole country; that is, it was 0.889 cent for this one railroad last year, and for the year ending December 31, 1893, it was, for the whole country (according to Poor), 0.893 cent.

The circumstance of the purchase of the Chesapeake, Ohio & Southwestern by the Illinois Central and the agreement to sell the property to the Louisville & Nashville were explained in our analysis of the annual report of the Illinois Central, published September 28. That transaction, it will be remembered, is stopped for the present by legal proceedings, but the Chairman of the Louisville & Nashville states that it is believed that the suit will be won on the appeal, and the properties acquired as the contract intends.

New York, Ontario & Western.—The report for the year ending June 30, gives the earnings on 477 miles of road, no addition to the mileage having been made since the building of the Scranton Division, which was opened in July, 1890. The results of operations have been as follows:

	1894.	1893.	Inc. or Dec.
Gross earn.....	\$3,842,120	\$3,688,174	I 153,946 = 4 p. c.
Oper. expenses.....	2,627,879	2,697,783	D 69,904 = 2½ "
Net earnings (less taxes).....	1,109,579	889,948	I 219,631 = 25 "
Surplus.....	419,567	256,853	I 162,714 = 63 "
Gross earn. per mile.....	8,059	7,736	I 323 = 4 "
Net earn. per mile.....	2,547	2,077	I 470 = 22 "
Surplus per mile.....	880	538	I 342 = 63 "

The per cent. of operating expenses to earnings was 68.4 as against 73.1 per cent. in 1893 and 72.2 per cent. in 1892. In 1890 the operating expenses were 76.5 per cent. of the earnings.

The increase in earnings was from the anthracite coal and the milk traffic, the revenue from which increased \$324,000. Local and through freight receipts decreased \$146,79. The revenue from anthracite coal traffic was \$1,753,874 or \$371,335 greater than in 1893, the tonnage being 1,642,063. The milk traffic gave the company a quite respectable income, \$354,037. This tonnage has increased 51 per cent. in five years, and last year was 55,729 tons. These two classes of freight therefore offset the loss in the general freight and passenger business.

The income from the World's Fair business is given as \$50,000 after deducting all extra expenses incidental to it, and it is not at all certain if the road did not actually lose money directly from this business. That is, \$50,000 was left to pay all the ordinary expenses of carrying 7,400 passengers both ways, over the lines of the road. The indirect loss, from interruption of other business can hardly be doubted.

The company carried 7,397 World's Fair passengers, 5.4 per cent. of the total carried by all the Trunk Lines out of New York. Three thousand of these passengers, 11.7 per cent. of the total over its line, were carried on the low-fare, day-coach, excursion trains. Even including this travel the number of passengers carried was 12 per cent. less than in 1893, most of this loss being in the emigrant class. The company derived only \$55,812 from that traffic last year, a decrease of 49 per cent. Regular excursion traffic was less as to number of excursion trains run—135 as against 148 in 1893—but the revenue was a trifle larger. The whole number of passengers carried was 926,657, a decrease of 12.4 per cent. The number of passengers carried one mile was 36,918,802, a decrease of 8.5 per cent. Through first-class passenger travel was 73.5 per cent. greater than in the previous year, second class and emigrant passengers being 43 per cent. less.

The average fare per mile was 1.839 cents as against 1.797 the year before.

The earnings were divided among the following items:

	1894.	1893.	Inc. or Dec.
Passengers.....	\$679,149	\$725,471	D 7 p. c.
Freight.....	2,997,011	2,819,717	I 6 "
Mails, express, etc.....	124,841	106,391	I 17 "
Miscellaneous.....	41,118	36,595	

There were 2,404,358 tons of freight carried, an increase of 4.9 per cent., the increase having been entirely in coal, which increased 21.5 per cent. (289,838 tons) while other freight fell off 177,000 tons. The total ton-miles were 328,533,616, an increase of 11.5 per cent. The rate per ton per mile was .912 cents as compared with .956 cents in 1893 and .939 cents in 1892.

The principal items in operating expenses were:

	1894.	1893.	Inc. or Dec.
Conducting Transportation.....	\$810,185	\$822,880	D 1 p. c.
Motive Power.....	832,455	889,646	D 6 "
Maintenance of Way.....	490,015	465,164	I 5 "
" " Cars.....	229,857	252,114	D 8 "
General Expenses.....	114,471	115,018	
Miscellaneous Expenses.....	150,896	152,960	

The expenditure charged to construction and improvement was \$250,536, of which \$115,291 was for improvement of the road and \$74,000 was for new equipment.

The Supreme Court of the United States began its October term last Monday, and it is stated that the pressure on the docket has been much relieved by the work of the new Circuit Courts of Appeals, so that the great delays which every case has for many years been subject to will soon be done away with. Next week the Court will take up the suit of the Government against the Union Pacific Railway and the Western Union Telegraph to cancel the contracts made between the railroad and the telegraph company, on the ground that they are in restraint of trade and commerce. This test case was decided by Justice Brewer on the circuit in favor of the Government, but was reversed by the Circuit Court of Appeals at St. Louis. The case against the Trans-Missouri Freight Association, alleging violation of the Sherman anti-trust law, will also come up. The railroad companies will move to dismiss this case on the ground that since the decision of the lower court they have voluntarily dissolved the association. The Government will contend that this is no ground for abating the suit, especially in view of the fact that most of the companies immediately entered into a new combination, which the Government claims to be quite as objectionable as the first. The Circuit Court of Appeals, at St. Paul, sustained the lower court in this case, holding that the agreement constituting the Trans-Missouri Freight Association was not illegal.

The Circuit Court of Appeals last week sustained Judge Ricks, of Ohio, in his decision fining James Lennon, a Lake Shore & Michigan Southern engineman \$50 for refusing to haul cars going to the Toledo, Ann Arbor & North Michigan, at the time of the strike on the latter road, in March, 1893. This decision is final, as the Supreme Court has refused to consider the case. In his decision on this case Judge Ricks discussed the general question of the "right to quit" (six other enginemen, having resigned at the time that Lennon tried to aid the strikers without resigning), but it did not come up in such a shape as to demand exhaustive treatment, and Judge Ricks turned it off with very few words. The essential point in the charge against Lennon was discrimination, in refusing to move cars for one party, while not refusing to move any others. Another case of interest before the United States courts is that of the Brotherhood of Railroad Trainmen against the Receivers of the Philadelphia & Reading, which was presented to Judge Dallas at Philadelphia last Monday. The proceeding seems to be a premeditated attempt of the Brotherhood to get a decision as to the "rights of organized labor" on a railroad, without much regard to whether there is or is not a grievance of any consequence in this particular instance. The case appears to have been managed in a bungling manner. In the first place, two or three lawyers, apparently not well known in Philadelphia, asked for an order restraining the receivers from discharging certain employees because they belonged to a Brotherhood, but the name of the Brotherhood was carefully concealed from the reporters. On further hearing, however, it was shown that the first employee had been at work for the road only one week, and had signed an agreement not to belong to a Brotherhood. The status of the second employee was precisely the same, but the railroad company had lost the paper he signed, and agreed not to dismiss him. Then the lawyers for the Brotherhood withdrew both names and wanted to substitute in the petition the name of a new man, but this the judge would not allow. Grand Master Wilkinson then asked leave to appear, but the judge ruled that he had no standing in court. Evidently the Reading has been rigid in requiring employees to renounce the Brotherhood and to put the agreement in writing, and Mr. Wilkinson's Brotherhood is going to challenge the legality of such action.

The British Board of Trade has just issued its general review of railroad accidents for the year 1893, being a summary of the detailed reports issued quarterly, and containing a few comments. The number of train accidents attended with fatal results to passengers was only three and the number of passengers killed from causes beyond their own control was only 17, or one in 51,000,000. Even

when all causes and classes of accidents are taken into account only one passenger in 8,237,519 was killed, and in both these averages the season ticket passengers are omitted. A large proportion of all the deaths and injuries in train accidents were due to four derailments. One of these, it will be remembered, that at Lantrissant Junction, on Aug 12, killed 12 passengers and one man who was assisting in rescuing the injured from the wreck. The number of accidents investigated by the inspectors of the board was only 46; the year before the number was 48 and the average for the previous seven years was 61. The table of causes shows that negligence in operating figures in 37 of the 46 accidents inquired into. Defective switches or signals are charged with a portion of the fault in seven accidents; no other cause appears in more than five. From the general remarks at the close of the report we extract the following:

In consequence of the action taken by the Board of Trade in 1892, meetings of the representatives of the companies have been held to consider the arrangements under which trains on converging lines are allowed to approach junctions simultaneously under the "Section clear, but junction blocked" signal, and a committee of experts has been appointed to assimilate, as far as possible, the methods of block-signalling throughout the whole of the country. Owing however, to the diversity of instruments employed, and partly to differences in the mode of working, a final conclusion has not yet been arrived at, but it is hoped that ere long satisfactory arrangement may be made. . . The Board of Trade have continued to urge the Railway Companies to instruct their servants to refrain, except in cases of emergency, from using the continuous brakes to stop trains when entering terminal stations. Drivers should reduce the speed of their trains by the use of the hand-brakes, with the assistance of those in the guards' vans, and only rely on the continuous brake as a reserve of brake power to fall back on when necessary. On some of the more important lines these views have been adopted.

Sir Courtenay Boyle, who has formerly made these reports, is now Permanent Secretary of the Board of Trade, and the present document is signed by Mr. Francis J. S. Hopwood, C. M. G., the Assistant Secretary in charge of the railroad department.

In the *Railroad Gazette* of September 7, the statement was made that "Pennsylvania has now a law requiring the railroads in that state to equip their cars with steam heating devices." Our attention has been called by two or three persons to this statement, and running the matter down, we find that it was a misprint, as will be obvious to anybody who reads the paragraph carefully, the copy having been written "has no law." We regret the carelessness which allowed such a misstatement to get into our columns. In fact, we have, within a day or so, seen a letter from the Secretary of State of Pennsylvania, saying precisely "there is no law in the State of Pennsylvania relative to the heating of railroad cars." We may add, that so far as we know, there is no law in any state of the Union requiring cars to be heated by steam; nor is there any law compelling the disuse of individual heaters except in New York and New Jersey. Four states at least forbid the use of "common stoves," but none of them forbid such a device as say the Baker heater, with its long record of efficiency and safety, except New York and New Jersey, which forbid the use of "any stove or furnace." Almost invariably, the states which have enacted laws regulating this matter of car heating, have left it discretionary with the Commissioners to say whether any given method is or is not safe; and even in the case of New York and New Jersey the clause "except in an emergency" neutralizes to a considerable degree the mandatory effect of the Act: for it becomes there a question of interpretation—what is an emergency? And we may suppose that the interpretation would be liberal, considering the obvious absurdity of a law which aims to make forever impossible any individual heater, regardless of its merits.

Local expressmen, persons who desire to do a primitive coat-pocket express business by railroad between Boston and suburban towns, seem to engage a good share of the time of the Massachusetts Railroad Commission of late. There are a good many of these, doing business by freight train; but that is a little too slow to suit them, and at the last session of the Legislature they got a law passed empowering the Railroad Commissioners to give every such expressman, on demand, a "recommend," the possession of which should compel the railroad company to grant him terms equal to those granted other express companies. But conservative members saw to it that the law should be quite carefully worded to protect the rights of express companies already doing business on a railroad, and the Commissioners are not obliged to grant the desired certificate unless they believe the public interest requires additional express facilities, and so the law has not revolutionized anything as yet. The Commissioners have had several applications, but have not, we believe, granted any recommendations. One application from Manchester (whether by-the-sea or not, is not stated) was refused because the town already had two express lines to Boston. Evidently there is no real use for the law except in cases where an existing monopoly gives deficient service or charges too high prices.

On another page we give a short abstract of the preliminary report of the Chief Engineer of the Rapid Transit Commissioners of New York. It will be observed that he does not discuss any of the questions involved in reaching a decision as between an elevated and an

underground railroad for New York, and that the New York daily newspaper which said that "now, in the light of this report, no sane man can think of elevated railroads" was going a good deal further than Mr. Parsons has gone and a good deal further than any interpretation of the report would warrant. But for reasons that are not set forth in this report the Rapid Transit Commissioners will no doubt decide to build an underground railroad if they are ever called upon to build any, which is by no means sure to happen.

At the last regular meeting of the American Society of Civil Engineers, the result was announced of the canvass of the letter ballot on amendments to the constitution. All of the amendments were carried. Quite a number of these were verbal changes of only secondary importance. One affected the form of presenting applications for election in the Society and was of considerable importance. But the amendment of the greatest importance was that placing the election of the Secretary in the Board of Direction, and this was the amendment which it appeared possible might be defeated. It was carried by a surprisingly large majority of those voting; that is, out of a pretty large vote there was not more than 10 per cent. against it. It has long seemed to us that this is, for several reasons which it is not necessary to go into now, an excellent change.

The order of the Interstate Commerce Commission prescribing the form and contents of tariffs, which has recently been issued, was noticed in the *Railroad Gazette* of Sept. 28. Since then we have received the full text of the order, from which it appears that the Commission will not rigidly require railroads to show upon each tariff every route which can be made under it, but only the names of the roads which have authorized its use. The decision says that it is the aim of the Commission to exercise its authority in aid of the substantial purpose of the law rather than to insist upon the technical observance of its provisions. At the same time it is expected that wherever practicable, which, it is believed, will be in the great majority of cases, every route that can be made by combining the rates shown in a tariff, shall be clearly stated.

The use of street cars for distributing mail matter, which has been a marked success in St. Louis for a year or two, is to be tried in Pittsburgh. The branch office at the East End will now receive letters from the main office 20 times a day instead of 10. The Postmaster expects not only to expedite the mails but to make a material reduction in expense. Mr. Charles Neilson, Second Assistant Postmaster General, is taking an active interest in this subject, and intends to take action which will lead to the utilization of electric railroads in all large cities where the promptness and frequency of transmission can be promoted thereby.

NEW PUBLICATIONS.

The Cattle Guard Problem. By Benjamin Reece, C. E. Together with the Law of Cattle Guards and Railroad Fences. Chicago and New York: The Q & C Company, 1894.

Mr. Reece has made a substantial octavo pamphlet of 70 pages, including an alphabetical index, on good paper, and well printed, in which he undertakes to give a fair statement of the scope and effect of the laws concerning cattle guards and railroad fences and of the obligations devolving upon railroads. The first 10 pages is devoted to a general discussion of cattle guards and of the growth of the law affecting fencing. Incidentally, we may say, that the author believes in a metal surface guard so constructed as to inflict pain upon the animal and yet without projecting points to catch hanging chains or rods. Much the greater part of the pamphlet is given to a digest of the common law and of the statutes of the States with copious citations of decisions. The statutory obligations of the railroads as to fencing are arranged in a very compact digest.

The Engineering Magazine.—In the October number is begun a classified index to leading articles published in the technical journals of the United States and Great Britain. It is proposed to give reviews of such articles as are deemed the most important; to supply a carefully classified index to all the leading articles; and to furnish the full text of any of those articles to persons who may want them. The plan is an excellent one, and of course its value to the reader of the magazine will be limited only by the ability with which it is carried out. The editor says that it is his intention to do for industrial literature what the *Review of Reviews* does for the political and literary field, and ultimately to make the best review and index that can be devised. The plan is an ambitious one and can only be adequately carried out by the co-operation of a good many men. People who have tried something like this before have speedily discovered that but very inefficient work is to be got out of volunteers; that the only way to do such work acceptably is by a well organized and paid staff. Whether or not the *Engineering Magazine* can afford in these times to employ men enough and men of sufficient knowledge and discrimination to make the department what the editor aims to make it, will appear in the result. The start made in the October issue is a good one, at any

rate, and we hope that the enterprise will be a great success.

Transactions of the Canadian Society of Civil Engineers.

Volume VIII, Part I; January to June. Montreal: 1894. This half yearly issue of the *Transactions* of the Canadian Society contains a number of interesting papers. The one which seems to us the most important is on the location and construction of the Great Northern Railway through the Rocky Mountains, and that will be reprinted at once in the *Railroad Gazette*. There are papers on Concession, etc., in Sewer Pipes; on a Street Railroad Power House, on the Dartmouth, N. S., Water & Sewerage Works; the construction of a small tunnel on the West Virginia & Pittsburgh Railroad, and on some applications of electric motors. In fact, there are two or three other papers of more or less interest. The frontispiece of the volume is an excellent portrait of Mr. P. Alex. Peterson, Chief Engineer of the Canadian Pacific and President of the Society in 1894.

The Aluminum World; Volume 1, Number 1. New York: 14 Lafayette Place. Monthly. Price, 20 cents.

The old hand, who year after year watches the rise and fall of new journals, is not likely to take very much interest in the appearance of any given one; but the *Aluminum World*, if it does not "fill a long felt want," at any rate sets out to occupy a brand new field. We discover in this first issue no prospectus stating precisely the object of publishing the journal; but its table of contents indicates a purpose to make it something more than a mere advertising circular. The first paper is on the Southern Bauxite Deposits, by Dr. C. W. Hayes, of the United States Geological Survey, and tells of the principal source of aluminum in the United States. Another paper is by Major A. E. Hunt, on the Uses of Aluminum; another one by Dr. J. W. Richards is on the Problem of Soldering Aluminum. Then follow European Notes, Aluminum Articles of Utility, Patents, a review of the metal market in various cities, and several pages of miscellaneous notes of more or less interest. We are glad to see that the editor proposes to spell aluminum without the superfluous i which the Englishmen are so fond of, unless his contributors positively insist upon that i.

TRADE CATALOGUES

Machine-Made Lime Mortar.—Some months ago the United States Mortar Supply Co. was organized in New York for the purpose of making and selling machine-made mortar, using patents controlled by Mr. W. W. Kenly, M. Am. Soc. C. E., who is the General Manager of the company. We have recently received a pamphlet giving a list of important buildings in New York which have been plastered with the mortar supplied by this company, and the list is long enough and important enough to indicate that the company is already remarkably successful. The mortar is delivered in bulk, in specially constructed steel casts, containing 27 cubic ft., wet and ready for use without the addition of any other material or further manipulation. It is delivered in any desired quantity at any specified place in New York City and in large quantities under special contract in Brooklyn, Jersey City and adjoining towns. The lime is slacked, the paste is screened, the sand is also screened through screens made of punched steel plates, lime and sand are accurately measured and all the ingredients come together at the head of the mixing machine and are thoroughly mixed. The mortar is then stored in bins and ripened before shipment. It is then delivered on barges to any convenient pier, thence hauled to the work in special carts. There can be no doubt we suppose of the great advantages of machine-made mortar over hand-made. It has been a decided success in other cities and it is only remarkable that it has not been used before in New York. The office of the concern is 289 Fourth avenue, New York City.

Tie Plates; Their History, Function and Design. By William Goldie. Pittsburgh: Dilworth, Porter & Co., Limited. 1894.

Last July we mentioned in this department a pamphlet issued by the Q & C Co., entitled "The Value of Tie Plates in Track Repairs," which was a reprint of a paper read before the Buffalo Association of Railway Superintendents by Mr. Benjamin Reece. In the pamphlet of 30 pages now before us, Mr. Goldie undertakes to analyze and reply to the most important of Mr. Reece's conclusions; and when two such high experts get into serious discussion it is well for the amateur to stand aside and watch the fun. Mr. Reece's contention was for the Servis tie plate with longitudinal flanges, his doctrine being that the longitudinal flange has unique virtues in that it compresses the fiber of the tie and holds it in place. This to his mind is the final development of the theory of the tie plate. Mr. Goldie, however, having a tie plate which engages in the wood by means of claws on each end, which cut the fiber transversely, is bound to show that the theory of compression of the fibers is entirely false. This is the fundamental ground of difference, but of course there are various other particulars in which the doctors disagree. Mr. Goldie's pamphlet is an unusually well-written document and we would advise the student of the subject to get it, as well as Mr. Reece's pamphlet, and carefully read them both.

Contractors' Tools.—Messrs. Thomas Carlin's Sons, of Allegheny, Pa., issue an octavo pamphlet of 117 pages

giving illustrations and descriptions of a great variety of contractors' tools and machinery, including engines, boilers, and brick machinery, besides hoisting engines and windlasses, derricks, rollers, contractors' cars, scrapers, pumps and small parts and tools.

Bolt and Nut Machinery.—An illustrated catalogue from the Acme Machinery Co., Cleveland, O.

The Acme Co. presents a catalogue of 108 pages excellently illustrated, showing its numerous machines and machine parts. A very imposing list of references to firms using this machinery is given.

TECHNICAL.

Transfer Boats for Lake Erie.

The Pittsburg, Shenango & Lake Erie Railroad Co. is, at the time of writing this, in consultation with various ship builders concerning the details of contracts for some new transfer boats to run from Conneaut, O., to Port Dover, Can. These boats will be put in service to interchange cars between the Pittsburg, Shenango & Lake Erie and the Grand Trunk, these two companies having entered into a track contract for 20 years for the interchange of business between Pittsburg and various Ohio points and Canada. The traffic will be mainly coal, coke, lumber, and iron and steel products.

Chicago Sanitary District Matters.

The report of Chief Engineer Randolph, of the Chicago Sanitary District for the month of August, shows that the work done averaged over 30 per cent. in excess of the amount required. A deficiency in the work done was shown on but six of the twenty-eight sections under contract. The glacial drift removed from the main channel amounted to 8,022,040 cubic yards, and from the river diversion, to 1,115,549 cubic yards. Of solid rock there was 3,626,311 cubic yards removed from the main channel, and 221,483 cubic yards from the river diversion. The total cost of the work done by the contractors on the main channel was \$665,052.31. Streeter & Kenefick, the recently deposed firm of contractors on section E, have notified the trustees that they have received no official notice of ouster and that the board had no right to forfeit the contract as the firm was at work in accordance with the specifications. The firm reserves its legal rights for future action and announces that it will lay claim to \$29,000, the difference between its price and that of Angus & Gindele, who secured the contract after forfeiture.

A New Rail Bender.

A new adaptation of the ratchet wrench has been made for use in rail-bending. The benders are of the ordinary screw-type, the screw having a square head upon which the wrench fits. The wrench is a ratchet wheel with a square hole to fit the screw-head, cut through the solid piece, which turns in a housing. The latter protects the ratchets from dust and is rigidly attached to the six-foot handle. A thumb key is used to set either the right or left ratchet in gear. About 12 inches back movement at the end of the handle will engage the active ratchet with another tooth, thus allowing the operator to be always in an effective position for rapid work. The entire rail bender is light and economical for its power. It was shown by the Pennsylvania Steel Co. at the Roadmasters' Convention in New York.

The Chesapeake & Delaware Canal.

By the last River and Harbor bill the President was authorized to appoint a board to make studies for the canal, long talked of, between the Chesapeake and Delaware Bays, giving, in fact, a direct deep water canal for the harbor of Baltimore. The appointment of this Board has been announced by the War Department as follows: General Thomas Lincoln Casey, Chief of Engineers, U. S. A.; Colonel W. P. Craighill, Corps of Engineers, U. S. A.; President American Society of Civil Engineers; Captain George Dewey, U. S. N.; Mendes Cohen, Esq., ex-President American Society of Civil Engineers, and J. Alexander Porter, Esq. This Board, like the one appointed for the study of the scheme for a bridge across the Hudson River at New York, is one of singular ability, and the country owes to the President or to the Secretary of War, or to both, a debt of gratitude for the appointment of such men for these two important studies.

The Hennepin Canal.

United States authorities have confirmed the contracts for the second section, four miles, of the Hennepin Canal, and the contractors have put nearly 1,000 men to work. The first and fourth miles of this section are let to William Callahan, of Omaha, and the second mile to James Carroll, of St. Louis. The total amount of contracts let on the section is \$150,000. The Government is laying a railroad along the right of way of the canal for transporting material for locks. A pretty heavy force of men is also at work on the first four-mile section of the canal proper.

Electric Motor Patents.

In the United States Circuit Court at St. Louis, Sept. 17, Judge Priest read the decision in the suit of the Adams Electric Co. for alleged infringement of a railway motor patent against the Lindell Street Railway, the decision being by United States Circuit Judge Moses Hallett, of Denver, Col., who heard the case in St. Louis last May. The case was dismissed. The suit was brought against the Lindell Railway Co. as a test case. The suit was brought to maintain the right of Dr. Wellington Adams, as the alleged inventor of the method by which electric

energy could be transmitted to a road motor. In an interview in regard to the decision, Dr. Adams said: "This decision is a great surprise to us. Judge Hallett has adopted the defendant's line of argument all through, and does not decide upon a single point at issue. We shall carry the case to the United States Court of Appeals. The decision of Judge Hallett will not affect the St. Louis & Chicago Electric road except that it will not be able to keep out competition as it otherwise would."

The Jeddo Tunnel.

Further work on the great Jeddo tunnel in Luzerne County, Pa., has been stopped by an injunction. This tunnel is designed to drain 40,000,000 gallons of black mine water daily into the Nescopeck Creek, which empties into the Susquehanna, and is nearly completed. The cost of its construction is being borne jointly by the various operators who have flooded mines in that region.

Fuel Gas in Chicago.

A fuel gas company has contracted for 3,000 tons of cast iron pipe to be laid through the streets of Chicago.

Profits of German Steel Companies.

Prices and profits of iron and steel manufacturers have greatly declined in Germany, as in this country and Great Britain. Recent reports show that for the financial year 1893, the Bochum Company only distributed a dividend of 3½ per cent., as compared with 6½ per cent. for the previous year; the Gutehoffnungshutte at Oberhausen, paid a dividend of 4 per cent., as compared with 5 per cent. in the previous year; the Georg Marienhutte paid a dividend of 4 per cent., as compared with 5 per cent.; and the dividend of the Phoenix Company, at Laar has also been reduced by about an equal amount, while the value of its manufactured products has fallen from £1,000,000 to less than £900,000.

Heavy Rails in Switzerland.

The adoption of heavy rail sections on some of the Swiss railroads has been the natural outcome of increased train speeds and locomotive weights. On the St. Gothard line 96.6, 92.5, and 88.4-lb. rails are used on about 60 miles of road, while on the Jura-Simplon line 84.4-lb. rails have been put down on a stretch of 51.5 miles.

Master Car Builders' Standards.

Lithograph copies of the latest revised Standards and Recommended Practice, which are illustrated on a reduced scale by 15 sheets in the back of the Proceedings of 1894, may be had on a similar number of sheets 30 by 38 in., by applying to the office of the secretary. Blue prints can be taken direct from these sheets. These sheets will be sold at 25 cents each, plus postage when sent by mail. Orders should specify how to ship if they are to go by express. Pamphlets containing the revised texts of Standards and Recommended Practice, the same as printed in the Proceedings of 1894, together with the reduced cuts as there given, will be furnished at 10 cents each. The lithographs and the pamphlets are now ready for delivery.

Superior-Mississippi Canal.

United States Engineer Major C. B. Sears is making arrangements to place four engineering parties in the field to make surveys of the possible routes for the proposed canal connecting the waters of Lake Superior with those of the Mississippi. Congress appropriated \$10,000 for the prosecution of this work, and an effort will be made to complete the surveys before Congress reconvenes.

The Northwestern Dock at Superior.

The Northwestern Coal Railway Co., which is building a new dock at the head of Lake Superior, will be receiving coal next week. The dock, as now completed, is 475 by 1,000 ft., only one-sixth of the entire plan being constructed. When completed it will have a frontage of 6,000 ft. It will have four loading tracks, storage bins of 48,000 tons capacity, 240 coal runways, with a total hourly capacity of 8,400 tons, and the dock will be able to store 1,000,000 tons, or handle more than twice that. In the immediate vicinity of the dock the Chicago, St. Paul, Minneapolis & Omaha road is putting in a yard of 45 tracks and a mile long, as well as a 20-stall round house.

Steam Hose in Car Heating.

The difficulties in the way of making a rubber hose for car heating purposes are considerably greater than those in the way of making a good hose connection for air-brake service, and that everybody knows has been hard enough; in fact, the rubber companies have tried for some time to get up a hose that would last at least a year in car heating service. Hose in this service fails principally by swelling inwardly, so as to decrease the caliber, also by the chipping off of the lining which is carried through into valves and traps, clogging the passages. It appears to have been decided by much experiment that the use of minerals in large percentage is a mistake; and so of the attempt to keep the caliber perfect by the use of wire on the inside. Both of these devices have been found to be actually injurious, the wire destroying the lining more rapidly than where it was not used. There seems to be a growing opinion among manufacturers that there is no short cut, but that the only way to produce a good hose is to use the best material, regardless of cost, and hose manufactured on this principle, using thoroughly high-class material all the way through, has shown good results, increasing of course the price, but making it cheapest in the end. We are informed by officers of the Peerless Rubber Manufacturing Co., for instance, that they have tried this policy, to the exclusion of experiments in other directions, during the years 1893 and 1894

and that hose manufactured in this way lasted a season, and that 80 per cent. of it is still in good condition and good for service for the coming season. Mr. Dale, General Manager of that company, informs us that he has found an excellent compound for steam hose in use in England, the basis being a fine Para rubber; and while he does not pretend that there are any important secrets in the manufacture of mechanical rubber goods he does think that by the use of fine Para and such mineral constituents as will not impair the elasticity of the gum he is getting better results than have been obtained before in American practice. Consequently, his company is now prepared to supply hose for car heating and guarantee it for one season. In fact, the company claims that between the coaches at least 90 per cent. of this new hose will wear two seasons or longer, but that it must be taken care of in the summer; that is, taken off and put away where it will be kept in order.

Sixty-foot Rails for the Pennsylvania.

The Cambria Iron Co.'s new rail mill at Johnstown, Pa., is working on a large order of 90 lb. 60 ft. steel rails for the Pennsylvania Railroad Co.

Electric Railroad for Buda-Pesth.

The concession for the underground electric railroad for Buda-Pesth was granted Aug. 10, and the company to build it was immediately organized. Its cost is estimated at 9,000,000 francs and its length is a little over 3½ kilometers. A portion of the line is to be finished before the end of 1895 and the whole open for operation by April 1, 1896.

Improving the Canadian Canals.

Six tenders were received at the Department of Railways and Canals at Ottawa, for the work of deepening the Lake St. Louis ship canal in order to give a depth of 14 ft. of water. The Weddell Dredging Co., of Trenton, are the lowest tenderers. The contract for deepening the Lachine Canal has been signed by Messrs. McNamee & Mann.

Electricity in Locomotive Works.

It is said that the Western Electric Co., of Chicago, is putting in a considerable new electric plant for the Brooks Locomotive Works. This will include new lighting apparatus, also conductors and motors for working an overhead crane in the boiler shop, a transfer table, fans and various tools.

The North Sea Canal Opened.

The great sluice of the North Sea Baltic Canal was officially opened Sept. 29 by the members of the Construction Committee, who sailed through the waterway on board the Government steamer Berlin. They were followed by steamers conveying parties from Munich, Dresden, Stuttgart and other places.

New Stations and Shops.

The Berlin Iron Bridge Co. will furnish the iron roof trusses for the new city armory, at Pawtucket, R. I. The new power-house for the Bridgeport Traction Co., at Bridgeport, Conn., consisting of a dynamo room and a boiler room, will be of iron and brick composite construction, designed and built by the Berlin Iron Bridge Co. The dynamo room will be controlled by a traveling crane, furnished by the same company.

THE SCRAP HEAP.

Notes.

At the annual State election in Florida, which was held on October 2, the party which advocated the establishment of a railroad commission was defeated.

The Delaware, Lackawanna & Western has begun suit in the Supreme Court of New York against the New York, Susquehanna & Western for violation of a coal traffic contract. Since the Susquehanna completed a terminal of its own at New York Harbor, it has taken to that terminal all the coal that it could, and now the Lackawanna claims that some has been taken which ought to go to the Lackawanna terminal, under the old contract, which was made in 1882; and the complaint in the suit alleges \$4,950,000 damages, which is the estimated amount of profits which would accrue if the contract were to run 99 years, as it is claimed this one should run. The defense is based chiefly on the ground that the contract is contrary to public policy.

Waring Bros. have sued the Pennsylvania Road at Pittsburg for \$2,300,000, alleged overcharges on oil transported between 1873 and 1876.

It is stated that the Pennsylvania has issued an order making the working time in its shops 8 hours a day, and announcing that this will be the rule until March 1.

A passenger conductor of the Atlantic & Pacific, who was discharged during the Debs strike, complained to the United States Court, by which the Receiver of the road was appointed, alleging that he was not in sympathy with the American Railway Union, and the Judge has now ordered the Receivers to reinstate him.

The Rochester & Glen Haven Railroad, which was built a few years ago from Rochester, N. Y., to reach a summer resort about three or four miles northeast of the city, and which has hitherto been operated as a steam railroad, will next season be operated by electric power. The trains do not run during the winter months.

Car Transfers for the Long Island Railroad.

Jackson & Sharp Co., of Wilmington, Del., has contracted to build two large car floats, each 230 ft. long by 30 ft. beam and 8 ft. depth of hold, for the Long Island Railroad Company.

Limited Passes.

Those who best knew President Newell, of the Lake Shore, will best appreciate a recent exchange of courtesies between him and President Caldwell, of the Nickel Plate, now also General Manager of the Lake Shore. President Newell would give a man a \$100 bill and never think twice about it. When it came to giving passes over the Lake Shore he was adamant in his refusal. Those he did give were so limited to special trains that a number of the officials of the company have never yet ridden on the limited or fast mail trains.

It is the custom for all railroad Presidents to interchange annual passes, and on a recent New Years President Newell made up his list of exchange passes and sent them out. Across the end of the one he sent President Caldwell was printed in red ink the words:

Not Good on Limited or
Fast Mail Trains.

By return mail came President Caldwell's annual pass on the Nickel Plate for President Newell. Across its face in flaring red ink and in the bold handwriting of President Caldwell were written the words:

Not Good on Passenger
Trains.

This recalls the story of the General Passenger Agent, in Philadelphia, or somewhere, who was wont to limit excursion tickets so closely that the passengers had to be on the alert in surrendering the return coupon as soon as they entered the car for the return journey lest it turn to dust and ashes in their hands. One day the G. P. A.'s fish-dealer got stuck with one of those tickets (the conditions being printed in very fine type), and he determined to get even. So the next fish delivered was carefully selected for its very noticeable lack of freshness, and, of course, the cook reported it to the G. P. A.; but on close inspection the wrapping paper was found to bear, in small letters, the following words:

"In consideration of the reduced
price at which this fish is sold,
it will not be good after one
hour from the time of delivery."

Alley Elevated Affairs.

The minority stockholders of the Alley Elevated Railroad, Chicago, held a meeting Sept. 19 and entered a protest against the present management. They appointed a committee to call on President Hopkins and demand the privilege of going through the books. The charge was freely made that the Alley, which was projected as a rival of the South Side Cable lines, is being run in the interest of those surface roads. It was charged also that the present Directors were scheming to bankrupt the company, throw it into the hands of a Receiver, wipe out the entire capital stock of \$7,500,000 and turn the remains over to the bondholders.

Tank Cars for Wine.

The Paris, Lyons & Mediterranean Railroad has adopted a tank car for the transportation of wine, cider and raisins. It is an ordinary four-wheel freight car, such as are the standard on that road, but carries a cylindrical tank which has an interior capacity of 12 French tons. At each end of the tank is a dome provided with a proper cover and big enough to allow a man to enter for repairs. There is also a safety valve to permit the escape of gas produced by the fermentation of cider. It is provided with cocks and tubes for filling and emptying. Probably a car of this sort is not yet called for by the wine makers of California and Ohio, but it may not be many years before it is wanted here.

It seems that the Austrians have whiskey tank cars, and they seem to be well established in the trade, for the authorities in charge of the tax on spirits in bond request the railroad companies to furnish drawings of every such car, showing clearly the situation of the manhole and the faucet. Chrome steel, or other not easily tapped material, would seem most suitable for such tanks.

A Suit Over Rails Recovered from a Wreck.

The question as to the ownership of the rails recovered from the wreck of the ship *Abercorn* off the coast of Washington, has come before the courts for decision. Suit has been filed in the United States Circuit Court at Tacoma, Wash., by the State Trust Co., a New York corporation, against Chehalis County, Wash., P. Book, J. M. Weatherwax, C. P. Wilson and John G. Lewis. The complainant alleges that on June 19, 1894, the defendants unlawfully obtained possession of and converted to their own use 5,000 steel rails valued at \$42,000, belonging to the plaintiff, and have since that time refused to surrender the property. They were piled up near Cosmopolis, Chehalis County, having been brought to this coast from Mayport, England, by the ship *Abercorn*, which was wrecked off the Washington coast in 1887. The vessel and cargo were sold and the purchasers needing money with which to recover the rails, secured it from the State Trust Co., which thereby secured a lien upon and subsequently recovered the rails. Chehalis County levied a tax upon the rails, which was not paid, and last June they were sold for taxes to the individual defendants in the present suit. The taxes were \$700. It is intended to show that the tax sale was invalid.

The Tehuantepec Railroad.

The first through train from Coatzacoalcas to Salina Cruz left Coatzacoalcas on September 11, at 6.03 a. m., arriving at Salina Cruz, on the Pacific Coast, at 4.23 p. m., having made the run in 10 hours and 20 minutes. The time occupied in stoppages for meals, taking in water, fuel, etc., was 1 hour and 41 minutes. The mean speed, on the North Section, was 34 kilometres per hour, and on the south section 38 kilometres.—*Mexican Financier*.

Steel Ties in Mexico.

The work of substituting steel ties for wooden ones on the Mexican (Vera Cruz Railroad), is going on actively, and in a relatively short time, the entire line and branches will be laid with metal ties. Some 50,000 steel ties are being received yearly from England. A curious fact pertaining to steel ties has recently been noted. Ten years ago, at a point near Apizaco, a steel tie was laid, and, a few days ago, taken up and weighed, when it was ascertained that it had lost a pound, due, probably, in part to the abrasion of the paint. The original weight of the tie was 115 lbs.—*Mexican Financier*.

Gates for the Oregon Cascades.

The second shipment, amounting to 14 car-loads, of material of the lock gates now building by the Maryland Steel Co. at Sparrows' Point, for the government work at the Oregon Cascades has gone forward to its destination, where the parts will be put together. The gates

are built in sections weighing 10 tons each. Twenty six cars are required to transport one gate. Four gates, in all, are to be built.

The Proposed Inter-Continental Railroad.

The Inter-Continental Railway Commission has received the last of the surveys, field-notes, etc., for the Pan-American Railroad project. The work of the Commission is now being directed to elaborating the field notes and making the maps for the forthcoming report. It is probable that this will fill seven large volumes, four of text and three of maps.

The Johnstown Flood Suits.

After the Johnstown floods a fund of \$1,500 was raised by business men there to pay for the preliminaries toward instituting suits for damages against the South Fork Fishing Club. A fee of \$1,000 was paid to lawyers for an opinion, which was not favorable, and at a final meeting on the 15th the idea of bringing suit was wholly abandoned, and the remainder of the fund turned over to the hospital.

A Natural Mistake.

Train-Robber (in the Pullman)—"Your money or your life!" Sleepy Passenger (wrathfully)—"Confound you, porter! I'll call you when I want you."—*Life*.

Employees' Season Tickets on the Pennsylvania.

Employees of the Pennsylvania Railroad who work in Pittsburgh and live at suburban places on the line of the road have been notified of a change in the rates of fare charged them, which will hereafter be \$3 a month to and from all stations within 35 miles of the city. Heretofore the rates have been the same as those for school children, which varied according to distance. The rate from Greensburg, 31 miles, was \$8 and from East Liberty, 4 miles, \$2.15. It is stated that the same change will be made at all places on the company's lines east of Pittsburgh.

The Consumption of Rails in France.

Journal des Transports says that in 1893 the seven great French companies used 129,338 tons of rails. The average annual consumption for the last 14 years has been 170,000 tons.

Street Railroads in Paris.

A cable road connection with Montmartre, and a compressed air railroad between the Louvre and St. Cloud are said to be among the latest contemplated street railroad enterprises at Paris.

Swiss Railroads.

At the close of 1893 Switzerland had about 2,220 miles of railroad. Among these were 88 miles of combined rack and adhesion road; 4.3 miles of electric road; 49 miles of pure rack road; 26 miles of street railroad and 9.3 miles of cable road.

The Conductors' Insurance Association.

This association, known as the "Old Reliable," is now 27 years old. At the annual meeting held in Minneapolis last month reports were presented showing that the association has paid to widows and orphans of members over \$1,000,000, and to conductors disabled on duty over \$150,000, making a total of \$1,219,290. A convention and excursion has been held every year since the organization at Cincinnati in 1868. The excursion this year extended to the Pacific Coast, and the special train, which started from St. Louis before the meeting, traveled 6,043 miles. The headquarters of the association are at Columbus, O., and the President is Mr. W. O. Beckley, a conductor on the Wabash road between St. Louis and Kansas City. On the occasion of the recent excursion the members gave Mr. Beckley a gold watch. Most of the members of this association are passenger conductors and many of them are members of the Order of Railway Conductors, although the two associations are not connected with each other.

Sparks from the Crescent Anvil.

Quit hardening steel at the forging heat. Do not lay hot steel in a draft, or where it will cool unevenly.

A drill hardened on an ascending refining heat, will cut twice as much as one that is slightly overheated.

Where high steel has been put improperly into shapes liable to crack, try a bath of warm, muddy water, if oil is not at hand.

In annealing steel, care should be taken to get it hot through, and then it should not be soaked in the fire long enough to raise a harsh scale.

No hardened piece is as strong as the tempered piece; a slight tempering, say to dark straw or very light brown, gives great increase of strength, a much tougher edge and so little decrease in hardness that the difference is not noticeable.

It is very well to see that the furnace or forge where tools are hardened is not too tight a place. Colors look differently in bright sunlight and in a darkened corner. "Cherry red" is a color as varied as the different kinds of cherries in all stages of ripeness.

Illinois Commissioners.

The State Board of Railroad & Warehouse Commissioners of Illinois, has begun a three weeks' tour of inspection of the railroads of the State.

Train Robberies and Detectives.

No punishment is too severe for desperadoes who would wreck a railroad train and sacrifice scores of lives to secure the wealth of an express car. There is no sympathy for such men when they are shot down in cold blood by the trainmen. . . . There have been "train robberies," however, that were dramatic but suspicious. After the St. Joseph (Mo.) affair a year ago it was reported that the three men who escaped were detectives who had encouraged the three men shot to engage in this attack on the train, and that 25 armed police officers on the train, and three armed detectives associated with the three young robbers, made no attempt to capture them, but shot them down like dogs. The Coroner's Jury censured the police and the railroad officials.

The attack on the Santa Fe train at Gorin, Mo., Tuesday morning, bears a striking resemblance to the one above referred to. It seems to have been planned by a detective rather than by the robbers. The "desperadoes" were two farm hands, and one of them on his death bed, while making no excuse for his own action, claims that the whole scheme was worked up by McDaniels, the detective and newspaper man, who reported the affair to the railroad officials. The detectives did not plan to capture these men. They expressed their disappointment that one of them escaped unhurt and that the other was not killed instantly instead of living to tell his story. As the result of this failure to kill both men, McDaniels, the confederate, has disappeared, instead of posing as the hero who saved the train. This man McDaniels will bear close investigation. The accounts indicate that he planned the robbery for the double purpose of murdering the two men he persuaded to assist him, and of demon-

strating to the railroad officials his usefulness as a detective.—*Chicago Inter Ocean*.

Harbor Works at Bremer Haven.

The completion of the new harbor works at Bremerhaven, the port of Bremen, Germany, is now near at hand. They are part of the improvements which have been in progress for several years in connection with the deepening and straightening of the course of the river Weser. A new harbor basin has been constructed, connected with the Weser by a lock.

State Regulation of Railroads.

A Texas newspaper item of recent date says: "The Railroad Commission granted the Fort Worth & Rio Grande Railroad authority to make a contract to haul a circus outfit, consisting of fifteen cars." Whether the General Freight Agent can accept a dead-head reserved seat is not stated; and there is no mention of cigars for the Yardmaster. The Texas railroad law seems to be well-intentioned, but somehow it doesn't get down to practical details.

The East River Bridge Company.

On Tuesday of this week the Court of Appeals of the State of New York gave a decision confirming the decision of the General Term against the East River Bridge Co. This company had asked for the condemnation of certain property in West street, Spring street, The Bowery, and elsewhere, in New York City, and the General Term denied the petition. The Court of Appeals now sustains the decision of the General Term. The project of this company is to build a cross-town elevated railroad, under the form of an approach to its projected East River bridges. The lower court was not satisfied that the company had sufficient means in sight to finish the undertaking, or that it would be able to meet the claims of property holders.

Suez Canal.

We take from the *Journal des Transports* the following figures of the results of working the Suez Canal for the last three years:

Year.	Vessels.	Net Tons.	Receipts (francs).
1891.....	4,207	8,698,877	83,422,101
1892.....	3,559	7,712,028	74,452,436
1893.....	3,341	7,659,068	70,667,861

The maximum time occupied in transit through the canal the last year was 44 hours and 37 minutes, being by day only. A vessel going day and night has passed through in 13 hours and 33 minutes. Navigation by night is becoming more and more frequent, and last year nearly all of the vessels going through ran at night as well as during the daylight hours. The mean duration of transit during the year was 20 hours and 45 minutes.

Lake Notes.

Twenty-five million bushels, far more than ever before, of Canadian northwest wheat, will be exported of the present crop, of which four millions will go in bond via the United States at Duluth. Receipts of this grain at Duluth last week were 4,000,000 bushels, and it is going forward via Montreal and via New York, on through bills of lading from Duluth to Liverpool.

The Whaleback Shipyards of the American Steel Barge Co., which has had one vessel on the stocks for two years, has resumed work on the boat and will launch it in the spring. Reports from the northwest to the effect that the company has arranged to build several vessels, both at the head of Lake Superior and at its Pacific yard, are baseless.

Iron ore shipments from the Lake Superior region to October 1, were as follows: Gogebic range, 1,400,000 gross tons, Mesaba, 1,330,000 tons, Marquette and Menominee, 2,290,000 tons, Vermilion, 860,000; total, 5,980,000 gross tons. Two of the new Mesaba range mines have passed 400,000 tons each. The Duluth, Mesaba & Northern Road will receive in freights from the Oliver mine alone for the season \$400,000. The Oliver is outside the Rockefeller pool.

The Canadian "Soo" Canal.

We have already announced the opening, Sept. 24, of the Canadian ship canal at the Sault Ste. Marie. We now give further particulars of this important work. The canal is constructed through St. Mary's Island on the north side of the rapids of St. Marys' River and that river gives communication between Lakes Huron and Superior. At ordinary stages of the river there is a difference of 18 ft. in the levels above and below the island. The length of the canal across the island is 3,500 ft., but with the approaches it will be about 18,100 ft.

For contract purposes the work was divided into three sections. The contract for the lower entrance was entered into Jan. 30, 1889, for the upper entrance March 26, 1889, and for the canal and lift lock on Nov. 20, 1889. The scheme, as covered by these contracts, contemplated a lock chamber 600 ft. long and 85 ft. wide, with a depth of water on the sills of 16½ ft. at the lowest known water level; the width of the gate entrances to the lock to be 60 ft. and the lock was designed to pass two vessels at one lockage. The prism of the canal was to be 18 ft. below the lowest level of the river above St. Mary's Island. June 3, 1891, a supplemental agreement was made with the contractors for the canal and lock, Messrs. Hugh Ryan & Co., whereby the length of lock chamber was changed to 650 ft., width 100 ft., depth of water on the sills 19 ft., and the time for completion extended from May 10, 1892, to May 10, 1893.

In the session of 1891, however, a discussion took place in the Dominion Parliament as to the desirability of making the entrance of the lock in a straight line with the walls of the chamber, and orders in Council were passed authorizing further changes with this view. A second supplementary agreement was accordingly made with the contractors April 5, 1892, the dimensions of the lock to be as follows: Length of chamber, 900 ft.; width, 60 ft. throughout, with a depth of 20 ft. 3 in. of water on the sills at the lowest recorded stage of the water in the river below the lock; the date for completion being fixed as Dec. 31, 1894.

Later, a further agreement was made with the contractors for the execution by July 1, 1894, of all the work under their contract, including the deepening of the canal prism to a further depth of 4 ft., making it 22 ft. By the scheme so modified, accommodation will be afforded to three vessels lying in the lock one behind the other; one of the lake type 323 ft. long and two of the Welland canal type 255 ft. long; with ready means of entrance and exit on a course through the gates and lock, in the line of the canal.

The canal proper will have a width at low water level of 152 ft. and a bottom width of 145 ft. The depth will be made suitable for navigation at extreme low water level, by vessels drawing 20 ft. The expenditure on this work up to June 30, 1893, was \$1,475,344, and up to Dec. 31, 1893, \$2,243,890. The appropriation for the canal was

\$4,000,000, and it is likely that it will be finished within the appropriation. The only serious defect that appears in the whole undertaking is the pier on which the railroad bridge stands, and which is built almost in the middle of the channel leading into the canal. The placing of this pier there narrows the width for navigation at this point to 70 ft., which is said to be too narrow. This, it is held, will be such an impediment to navigation that it will yet have to be removed.

Tonnage of the Sault Ste-Marie Canal.

The Sault Canal report for September shows that the month was, with the single exception of August, the greatest in the history of the water-way. 2,210,000 tons passing, against 1,404,000 for the same month in 1893, and 2,290,000 in August last. Of the total tonnage 1,040,000 tons were iron ore, 163,000 tons of wheat, 121,000 tons of flour, 53,000 tons of lumber, 56,000 tons of unclassified freight, and 627,000 tons of coal. For the season to October 11 the canal has passed 9,500,000 tons, against 6,100,000 tons to the same period last year. The present season will surpass the records of any previous season by at least two million tons.

Track Elevation in Chicago.

A tablet, intended to commemorate the first results of an organized and systematic effort to secure the elevation of the railroad tracks in Chicago, has been placed on one of the abutments of the Archer avenue subway. This was suggested and the necessary arrangements made by the Citizens' Committee on track elevation, an organization recently formed and having for its executive board Mr. R. A. Waller, General Fitzsimmons, Charles H. Wacker, Christopher Hotz, and Rev. Edward Kelley. The object of the committee is to keep up the track elevation sentiment and assist in bringing about the elevation of the tracks by all legitimate means. The table, bearing the names of the presidents of the two roads, the engineer in charge of the work, and the mayor and corporation counsel, was not so much intended as a memorial to these officials as to interest the public and create a sentiment which will not tolerate the interference of "sand bagging" aldermen. The Citizen's Committee hopes to subdue this tendency and to be of material assistance to the railroads and the city in their efforts.

LOCOMOTIVE BUILDING.

"Otis" steel was specified by the Illinois Central Railroad Co. for the boilers and fire-boxes of one-half the eight-wheel locomotives and moguls ordered from the Brooks Locomotive Works and the Rogers Locomotive Co., and it will be supplied by the Otis Steel Co., of Cleveland, O. In this column it was incorrectly stated last week that Carbon steel was specified for all of them.

CAR BUILDING.

Armour & Co. are reported in the market for about 400 cars.

The Atlantic & North Carolina Road will soon purchase additional rolling stock.

The Michigan-Penninsular Car Co., which started up its Detroit shops in July, has again closed its plant for an indefinite period.

The Southern Railway Co. is reported in the market for 500 coal cars for the East Tennessee, Virginia & Georgia.

The Delaware & Hudson Canal Co. has given an order to Jackson & Woodin for 200 box cars.

The Texas & Pacific Coal Co. has given an order to the Missouri Car & Foundry Co. for 200 coal cars. They will have the Schaeffer bolster and the New York air-brake. The Gould coupler is specified for 100 of the cars, and the Standard coupler for the other 100.

BRIDGE BUILDING.

Birmingham, Ala.—The County Commissioners received the following bids for the erection of the Warrior bridge which was carried away by a freshet some months ago: Alabama Bridge Co., \$10,500; J. S. Hutten & Co., \$11,700; R. D. Alexander & Co., \$14,200; Brackett Bridge Co., of Cincinnati, \$11,500; Edward Thacher, of Louisville, \$10,895; Dobson & Julien, \$10,600; Watkins & Hardaway, \$10,000; Southern Bridge Co., \$9,940; George H. Crafts, \$10,000; Youngstown Bridge Co., \$10,500; Detroit Bridge Works, \$10,800; Converse Bridge Co., \$11,240; Groton Bridge Co., \$11,000; King Bridge Co., \$11,175; J. H. Whitner, \$11,250. The contract was given to the lowest bidders, the Southern Bridge Company, of Birmingham, whose bid was \$9,940.

Boulder, Col.—The City Council of Boulder has let contracts for three additional bridges to be erected across Boulder Creek.

Chesapeake & Ohio.—The falseworks for the bridge building over the Big Sandy River, between West Virginia and Kentucky, were removed on Saturday last. The approaches, which are quite long on both sides of the river, are not nearly completed, but a double force will be put to work next week, and it is expected to have the bridge in use in another month. The new structure will shorten the run from Huntington to the Kentucky shore over a mile. The river has been very low all summer and the conditions all favorable for rapid work.

Cincinnati, O.—The contract for the bridge in Eden Park, in the center of Cincinnati, was awarded by the Board of Administration to the Melan Arch Construction Co., on its bid of \$7,130. Plans and specifications were drawn by Mr. Fr. von Emperger, Consulting Engineer, 71 Broadway, N. Y. Bridge to be of 70 ft. span, leading over Park avenue, 34 ft. wide and 120 ft. long, over all, very ornamental and must be completed in 60 days after the awarding of contract.

Cleveland, O.—Bids for the construction of the Columbus Street Bridge have been opened, as follows: Phoenix Bridge Co., \$27,160; Youngstown Bridge Co., \$27,856; Variety Iron Works Co., \$30,680; King Bridge Co., \$33,352; Wrought Iron Bridge Co., of Canton, \$36,440; Toledo Bridge Co., \$35,040; Columbus Bridge Co., \$35,440; Canton Bridge Co., \$36,480; Mt. Vernon Bridge Co., \$25,000; C. L. Stroble, \$36,660. The structure will require about 400 tons of steel.

Golden, Col.—The City Council has appropriated \$2,000 for rebuilding the iron bridge across Clear Creek on Washington avenue, which was destroyed by the June floods in Colorado.

Norristown, Pa.—The Pennsylvania Railroad has begun a suit to compel the Conshohocken Railroad Co. to build a bridge over the former's "Y" at this place instead of crossing at grade.

Lemont, Ill.—Bids will be received until Oct. 31, by the Clerk of the Sanitary District of Chicago, for supplying and erecting masonry for bridges to be built over

the Main Drainage Canal at Romeo on Section 12, Lemont, on Section 8 and at Willow Springs, on Section 1. Bids will also be received for building the bridges at these places.

New Orleans, La.—The City Council has directed the Comptroller to advertise for bids for building an iron bridge over the canal at Hagan avenue and Roman street.

Parkersburg, W. Va.—A new steel bridge over Neal's Run, 120 ft. in length, was completed on Saturday last by the Wrought Iron Bridge Co., of Canton, O. The old wooden bridge was torn down and the new superstructure put in place in three days, the masonry having been built up under the old bridge.

Seattle, Wash.—The following bids were received for erecting a bridge at Patten's Place, over Green River:

Seattle Bridge Co.—Pier and span, \$2,500. Approach, \$1.75 per linear foot.

Northwest Bridge Co.—Pier and span, plan B, \$2,161; plan A, \$2,660. Approach, \$1.80 per linear foot.

J. J. Maney—Pier and span, \$3,497. Approach, \$1.65 per linear foot.

San Francisco Bridge Co.—\$3,500, \$3,250, \$3,050, \$2,989, \$2,739, \$2,538, \$2,888, \$2,648, \$2,450, \$2,590, \$2,340, \$2,140. Approach, \$2 per linear foot.

McPherson Bros.—Pier and span, \$2,675. Approach, \$2 per linear foot.

Tacoma Bridge Co.—Pier and steel Pratt combination, \$3,374; pier and iron Pratt combination, \$3,350; covering galvanized iron, \$60; painting truss one coat, \$60.

John S. Anderson Co.—Pier and span, plan A, \$2,916; B, \$2,716.64; plan C, \$4,260. Approach, \$3.46 per foot.

John Welte pier and span, \$2,470. Approach, \$1.69 per foot.

Dickinson & Co.—Pier and span, \$3,525; steel chord bars, etc., \$3,440. Approach, \$3.65 per linear foot. The contract was awarded to the Seattle Bridge Co.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Arkansas the Supreme Court rules that the statute which requires corporations, companies and persons engaged in the business of operating or constructing railroads and railroad bridges and contractors and sub-contractors engaged in the construction of any such road or bridge, to pay their employees, on the day of discharge the unpaid wages then earned by them at the contract rate, without abatement or deduction, means without discount for paying in advance of the time fixed by the contract, and does not prevent the corporation from offsetting damages sustained by the employee's failure to perform his contract.¹

In California it is held that a conveyance to a railroad company of a right-of-way over the grantor's land, for its road, as already constructed and operated, to enable the company to use it as it was then using it, bars the grantor's right to damages for injury to his land, caused by the maintenance and operation of a defective bridge thereon, constructed before the execution of the conveyance.²

An Arkansas statute of 1887 regulating charges for carrying passengers, limits the fare on railroads in the State, over 75 miles in length, to three cents a mile. Section 3 provides that if any corporation "shall charge, demand, take or receive" a greater sum than that prescribed, it shall forfeit not less than \$50 nor more than \$300, etc. The Supreme Court rules that an honest mistake by a conductor in making change, whereby he received more than 3 cents a mile, will not make the railroad company liable to such penalty.³

In Texas it is held that an action will lie against a railroad company for personal injuries sustained while the road was in the hands of a receiver appointed by a federal court, if the earnings of the road while in such hands exceeded plaintiff's claim, and were all applied to the improvement of the road, and the road, in its improved condition, was returned to the company without a sale, and the receiver discharged; and an order of the Federal Court discharging the receiver, and requiring all claimants to intervene within a certain time, does not affect the company's liability.⁴

The United States Supreme Court holds that the Connecticut statute authorizing the railroad commissioners to order any railroad company, if in their opinion its financial condition will warrant, to remove a dangerous grade crossing, does not impair the obligation of contracts by reason of the large expenditure required, and the effect thereof on the contracts of the company with holders of its securities, where its charter is subject to amendment by legislative power.⁵

In Colorado it is held that the statute making railroad corporations liable for all damages by fire caused by operating their lines, is constitutional.⁶

The Court of Appeals of Kentucky holds that a mortgage, given by the L. to the C. Railroad, of the net earnings of all business coming to the L. Road "from or over" the C. Road, covers the earnings of business carried in both directions.⁷

Injuries to Passengers, Employees and Strangers.

In Indiana, plaintiff approaching a railroad crossing, listened for a train which he expected, and after it had passed, while he was 10 feet from the track, he drove forward, without looking in the direction from which the train had come until he was within 100 feet of the track, though he could have seen along the track when 35 feet from it. The Supreme Court holds, in an action for injury from a train running 12 seconds behind the first, at 15 to 20 miles an hour, without any signal, that plaintiff's failure to look was not negligence per se.⁸

In Indiana it is ruled that where plaintiff saw an approaching train, apparently about 50 or 60 feet away, when his horse's feet were almost on the track, and he was about 10 feet from it, being in such imminent danger, his attempt to cross ahead of the train, rather than to back, was not negligence per se.⁹

In North Carolina it is held that a locomotive engineer, who sees a man on the track, going in the same direction as the train, is justified in assuming that he will step off to avoid collision, when the danger signals are given; and the fact that a passing train on an adjoining track is making considerable noise does not render the engineer negligent in not attempting to stop his engine, since it is the duty of a person on the track to look, as well as listen.¹⁰

In Missouri, deceased, on a Sunday, took a seat in a caboose of a construction train on which the conductor had no authority to take passengers. It was made up as the regular week-day trains, there being no other car for passengers, and was manned by the same crew. The advertisement in the papers only mentioned trains on week days and was silent as to trains on Sundays, but it was not shown that deceased had ever seen the advertisement. The Roadmaster testified that on the preceding Saturday one of the deceased, for himself and the others, who

lived with him, asked permission of him to go on the Sunday train, but was told that passengers were prohibited on it. It was not shown that this refusal was communicated to the others. The conductor made no objection to the presence of deceased or others in the caboose, but when the train broke down, and it was necessary to drop the caboose, and go on with the flat and boxcars only, he told them to get off, as there would be no way for them to get back; but, on their saying that they would take the chances of returning he said no more; but at a station further on he told them that if they were back in 20 minutes they would not be left. No fare was tendered or asked. The Supreme Court rules that the evidence would not support a finding that they were passengers.¹¹

In Massachusetts it is held that one who does not know that passing express trains throw off mail bags on a walk leading to the depot is not, as a matter of law, negligent in walking along the middle of said walk without looking or listening for trains, the walk being 9 feet wide and its edge 2½ feet from the nearest track.

In the same case it is ruled that a person who, being temporarily in town, goes to the depot for a time table to see if there are any changes therein, is not a trespasser on the company's walk leading to the platform.¹²

In Texas it is held that where a person owns and keeps a lunch stand at a railroad station, by authority of the company, which can be approached only over the company's platform, the company is responsible for its condition to persons passing over it to make purchases at the lunch stand.¹³

In Texas it is held that when a passenger, attempting to board a car, is pulled off the steps by a porter, without any notice, because he carries a jug, which the porter tells him he cannot carry with him, and, after breaking loose, he attempts to enter, and is again restrained, the railroad company is liable for the assault.¹⁴

In the same State it is ruled that the fact that a passenger was sitting with his arm outside the window of the car does not, in law, preclude him from recovering for injuries inflicted on said arm, while in that position, which would not have been inflicted had it been inside.¹⁵

In New York a passenger in a sleeping car went into the dressing room at night, and, while looking for the water closet, the dressing room not being lighted, opened the rear door of the car, and fell out. The Supreme Court rules that he was not, as a matter of law, negligent in not calling the porter and waiting for a light.¹⁶

The Supreme Court of Massachusetts holds that the relation of a person to a railroad company as passenger ceases when he voluntarily leaves its train at a place not designed for the discharge of passengers, for the sole purpose of continuing his journey on foot, and it is under no obligation to furnish him a safe path for his further progress.¹⁷

In Pennsylvania it is held that in an action by a passenger for wrongful arrest and imprisonment, it is error to charge that plaintiff can recover only such damages as resulted from his being unable to complete his trip that day, since he is entitled to recover, in addition to actual expenses incurred, compensation for loss of time, interruption of business, bodily or mental suffering, humiliation, and injury to feelings.¹⁸

In the same case it is ruled that a carrier is liable for the wrongful arrest, without a warrant, of a passenger by policemen, in accordance with a telegram to its conductor from a detective, not only if the conductor participated in the arrest by pointing out the passenger, but also if he made no efforts to use his power as conductor to prevent it.

In Texas the Supreme Court decides that a contract between an express company and a railroad company for the carriage of the former's express matter and messengers, by which the "express company assumes all risk of loss or damages arising out of, or resulting from, its operations under" the contract, does not bind it to indemnify the railroad company against injuries to a messenger, resulting from the railroad company's negligence.¹⁹

In New York in an action by a passenger for injuries caused by another passenger stepping on plaintiff's foot, it appeared that the person who caused the injury was somewhat intoxicated, but not so far as to prevent him from walking. At the time of the injury he was standing in the car, holding to a strap, and lurching at every turn, and thus accidentally stepped on plaintiff's foot, causing the injury. The attention of the guard was called to the man, with the suggestion that he be put off or found a seat, but there was no evidence of any conduct on his part that would have justified his expulsion from the car. The Supreme Court rules that defendant was not liable.²⁰

¹ Leep v. St. Louis, 1 M. & S., 25 S. W. Rep., 75.

² McDonald v. So. Cal., 35 Pac. Rep., 643.

³ L. R. & F. S. v. Clark, 25 S. W. Rep., 504.

⁴ T. & P. v. Boyd, 24 S. W. Rep., 1086.

⁵ N. Y. & N. E. v. T. Bristol, 14 S. Ct., 437.

⁶ U. P. v. Tracy, 35 Pac. Rep., 537.

⁷ Schmidt v. L. C. & L., 25 S. W. Rep., 494.

⁸ G. R. & L. v. Cox, 35 N. E. Rep., 183.

⁹ G. & L. v. Cox, 35 N. E. Rep., 183.

¹⁰ Syme v. R. & D., 18 S. E. Rep., 114.

¹¹ Berry v. M. Pac. (Mo. Sup.) 25 S. W. Rep., 229.

¹² Bradford v. B. & M., 35 N. E. Rep., 1,131.

¹³ Dillingham v. Teeling, 24 S. W. Rep., 1,094.

¹⁴ G. H. & S. A. v. McMonigal, 25 S. W. Rep., 341.

¹⁵ G. C. & S. F. v. Danshank, 25 S. W. Rep., 295.

¹⁶ Piper v. N. Y. C., 27 N. Y. S., 593.

¹⁷ Buckley v. Old Colony, 36 N. E. Rep., 583.

¹⁸ Duggan v. B. & O., 28 Atl. Rep., 182.

¹⁹ S. A. & A. P. v. Adams, 28 S. W. Rep., 839.

²⁰ Thompson v. Man. Ry., 27 N. Y. S., 608.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Pittsburgh, Youngstown & Ashtabula, semi-annual, 3½ per cent. on the preferred stock, and 3 per cent. on the common stock.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atchison, Topeka & Santa Fe, annual, Topeka, Kan., Oct. 25.

Central Massachusetts, annual, Boston, Mass., Oct. 31.

Chesapeake & Ohio, annual, Richmond, Va., Oct. 23.

Cleveland, Cincinnati, Chicago & St. Louis, annual, Cincinnati, O., Oct. 31.

Illinois Central, annual, Chicago, Ill., Oct. 17.

Manhattan Elevated, annual, New York City, Nov. 14.

New Orleans & Northeastern, annual, New Orleans, La., Nov. 7.

New York, New Haven & Hartford, annual, New Haven, Conn., Oct. 17.

Northern Pacific, annual, Mills Bldg., New York City, Oct. 18.

St. Louis & San Francisco, annual, St. Louis, Mo., Oct. 23.
Seattle, Lake Shore & Eastern, annual, Seattle, Wash., Oct. 18.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Railway Association* will hold its fall meeting at the Hotel Brunswick, New York, on Oct. 17.

The *American International Association of Railway Superintendents of Bridges and Buildings* will hold its annual meeting in Kansas City, Mo., beginning Oct. 15.

The *American Society of Railroad Superintendents* will meet at the Hotel Brunswick, New York City, on Oct. 15.

The *American Street Railway Association* will hold its annual convention at Atlanta, Ga., commencing Oct. 17 and lasting three days.

The *Western Railway Club* will hold its first fall meeting at the Y. M. C. A. Building, La Salle Street, Chicago, Oct. 18, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October, at 10 a. m. At the October meeting Mr. Morford's paper on "Terminal Yards" will be the opening subject for discussion.

The *Southern and Southwestern Railway Club* meet at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station, on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Wednesday in each month, at 8 p. m. The headquarters of the society are at 51 Lakeside Building, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Foundrymen's Association* meets at the Manufacturers' Club, Philadelphia, Pa., on the first Wednesday in each month.

The *Western Foundrymen's Association* meets in room 701, Western Union Building, Chicago, on the third Wednesday of each month. B. W. Gardner, Monadnock Block, Chicago, is secretary of the association.

The Civil Engineers' Society of St. Paul.

The regular meeting of the Civil Engineers' Society of St. Paul was held Oct. 1, eight members and one visitor present.

A circular communication from Mr. E. L. Corthell, dated July 7, proposing an International Association of Engineers and Architects, was referred to Mr. Estabrook and Mr. Hilgard as a committee of consideration.

Printed copies of Mr. Woodman's paper on "Transition Curves" having been distributed among the members previously, the author opened the discussion by briefly stating his reasons for preparing the paper and afterward reviewed the somewhat complex work of Mr. C. L. Crandall. Other members spoke of personal experience with the easement curve and several letters on the subject were read. It was decided that the discussion should be continued at the November meeting.

Engineering Association of the South.

The regular monthly meeting of the Association was held at Nashville, Tenn., on September 13. Major Lewis presided. The appointment by the President of the following Nominating Committee was announced. J. B. Atkinson, B. Hall, J. S. Walker, who will present at least two names to the Association as candidates for officers and directors at the October meeting. Applications of Mr. Herman D. Ruhm, of Nashville, Tenn., and W. K. Gibson of Dayton, Tenn., of member-

ship were referred to the Board of Directors. An informal discussion of the best and cheapest culverts for areas under 50 ft. was had, but no conclusion reached.

American Society of General Passenger and Ticket Agents.

The semi-annual meeting of this association was held at Quebec on September 18. The question of appointing an arbitration board to consider differences between companies as to the proper method of apportionments of joint fares was settled by the association voting to establish an arbitration board of seven members from which three may be selected by parties desiring questions arbitrated. It was voted that hereafter the final destination as well as the starting point should be shown upon every coupon of an inter-line ticket.

The next question was regarding the practice of some ticket agents applying directly to the connecting roads for relief on account of errors in the sale of through tickets. This, in the language of the *Pathfinder Guide*, was a subject which "lines doing a competitive business treated with profound and marked respect, for reasons unnecessary to mention, and by a large vote it was practically dropped under the table."

Perhaps the most important subject before the committee was that concerning the printing of tickets. Representatives were present from the American Bank Note Co., (Mr. Lee) from the Rand-Avery Supply Co., (Mr. Gardner) and from Rand, McNally & Co., (Mr. Reed). The possible danger of loss by the use of forged tickets seems to be increasing and these gentlemen have already held conferences on the subject. An attempt will be made to arrange with some mill or mills to manufacture distinctive paper, to be furnished to printers only under the authority of the General Ticket Agents' Association. A committee of seven was appointed to report upon the advisability of such a plan. Mr. C. P. Atmore, of the Louisville & Nashville, is at the head of this committee.

Civil Engineers' Club of Cleveland.

At the meeting of the club, on October 9, Lieut.-Col. Jared A. Smith gave a brief account of "The Construction of a Sea Wall at Fort Taylor, Key West, Florida." A general discussion on the subject of the improvement of the Cuyahoga River within the city limits was had.

Western Foundrymen's Association.

The Western Foundrymen's Association visited in a body the works of the Illinois Steel Company at South Chicago, Wednesday, September 26, at the invitation of Messrs. Pickands, Brown & Co., pig iron sales agents for the Illinois Steel Co. The party, numbering in all about 80 spent several hours at the works. The handling of the material from the time it leaves the blast as iron ore until loaded for shipment in a finished state is done almost entirely by machinery. Though not working at present at their full capacity, about 3,000 men are employed in the works. A plate mill is now being built and will be in operation about the first of next year. The receiving and shipping facilities of the company are exceptionally good, the works being located on the shore of the lake at the mouth of the Calumet River, and connecting with most of the lines entering Chicago over roads controlled by the company. The works have a storage capacity for ore of over 1,000,000 tons and have plenty of room for growth without crowding. The party returned to the city about 5.10 and dined at the Palmer House, when Mr. E. C. Potter read a paper reviewing blast furnace practice.

PERSONAL.

—Mr. George B. Harper, General Superintendent of the Kentucky Midland Railroad, is now operating that property as Receiver.

—Mr. J. C. Tierney has resigned as General Roadmaster of the Peoria, Decatur & Evansville Railroad, and the position has been abolished.

—Mr. D. R. Shortwell, President of the Montpelier & Wells River Railroad, died at Montpelier, Vt., on October 4. He was also President of the Cambridge National Bank.

—Mr. E. C. Spalding, of Atlanta, has been appointed temporary Receiver of the Atlanta & Florida Railroad. Mr. Spalding is General Manager of the Southern Iron Car Co.

—J. C. Doughty, a locomotive engineer on the Truckee division of the Southern Pacific, has been nominated by the Republicans of Nevada as their candidate for Congressman.

—Prof. T. C. Mendenhall, recently Superintendent of the United States Coast and Geodetic Survey, has assumed the presidency of the Worcester Polytechnic Institute, Worcester, Mass., to which he was elected early in the summer.

—Mr. F. L. Garlinghouse, who was formerly Chief Engineer of the Pittsburgh Bridge Co., has accepted the position of Chief Engineer of the structural department of Jones & Laughlin's plant.

—Mr. F. P. Smith, who was until a year ago traveling representative of the Jerome Metallic Packing Company, has again assumed his former position with the company. Mr. Smith retains his connection with the Smith triple expansion exhaust pipe.

—Mr. Orlando W. Jackson, Master of Transportation of the Georgia division of the Savannah, Florida & Western road, died at Savannah, on Oct. 28. He was the oldest employee of the Savannah, Florida & Western, and had been with that road since boyhood.

—Mr. E. A. White, General Passenger Agent of the Mexican Central Railroad, has resigned, his resignation taking effect on Oct. 31. Mr. White has held this title since April, 1891, and for the year before that date was Assistant General Passenger Agent of the railroad.

—Mr. George H. Bryant has been appointed Western Representative of Thomas Prosser & Son, of New York. Mr. Bryant was formerly connected with the Q. & C. Co., and through that connection, and as the inventor of the Bryant metal rail saw, has become well-known in the supply trade.

—Mr. Willard A. Smith, of the *Railway Review* has been elected Second Vice-President of the National Malleable Casting Co., of Cleveland, O. He is to have charge of the railroad department of that company's business, and will have offices in the Old Colony Building, Chicago.

—Mr. John H. Parsons, Fuel Agent of the New York & New England, was knocked down by a runaway horse in Tremont street, Boston, Mass., on Oct. 8. His skull was fractured by the fall, and he died later at the City Hospital. He was at one time Division Superintendent of the Lake Shore & Michigan Southern.

—Mr. F. S. Thompson, who has been appointed General Superintendent of the Chesapeake & Ohio Southwestern, has been assistant to the Receivers. He suc-

ceeds Mr. G. J. Grammer, who resigned to go to the Lake Shore & Michigan Southern, the title of the office being changed from Assistant General Manager to General Superintendent.

—Mr. E. C. Palmer, Jr., has been appointed General Freight Agent of the Iowa Central Railroad, with office at Marshalltown, Ia. This office has been vacant for some time. Mr. Palmer has been Assistant General Freight Agent of the company, and that position has been filled by the appointment of Mr. J. S. Talbot, whose headquarters will be at Peoria, Ill.

—Mr. T. F. DeGarmo has resigned his position as representative of the Glidden Varnish Co., of Cleveland, O., to accept that of Manager of the Burns Automatic Coupler, manufactured by the Syracuse Malleable Iron Works, Syracuse, N. Y. Mr. DeGarmo's office will be at 1014 Havemeyer Building, New York.

—Mr. J. Elfreth Watkins, who resigned from the Smithsonian Institution to go to the Field Columbian Museum at Chicago, as curator of its railroad department, has resigned the latter office, and will return to the service of the Pennsylvania, with which he was connected for many years. We are told that his title to be historian of the company.

—General A. M. West, who recently died at Holly Springs, Mass., at an advanced age, was prominent in the South in military, political and business matters, and was a candidate in 1884 for Vice-President on the Greenback Labor ticket. In 1864 he was elected President of the Mississippi Central Valley Railroad, and held that office until 1875, when it became part of the Illinois Central.

—Mr. J. A. Hanley, Freight Traffic Manager of the Atchison, Topeka & Santa Fe, has resigned that office to take effect on Nov. 1. He has held the office for over five years, going to the Atchison Railroad in October, 1889. He had previously been with the Chicago, St. Paul & Kansas City, as Traffic Manager, and for over 18 years had held important offices in the traffic department of the Chicago, Rock Island & Pacific, Minneapolis & St. Louis, and other railroads.

—Mr. James Reed has resigned as Superintendent of the West Penn Division of the Pennsylvania. D. M. Watt succeeds Mr. Reed, and D. H. Lovell is promoted from the Superintendency of the Columbia and Clearfield Division to the place vacated by Mr. Watt, as Superintendent of the Monongahela Division. Frank F. Robb, formerly Assistant Engineer of the Middle Division, is transferred from of the Bedford Division to Superintendent of the Cambria & Clearfield.

—Mr. Everett E. Stone has been appointed Assistant Engineer of the Boston & Albany Railroad. He takes the position formerly filled by Mr. Walter Shepard, who is now Chief Engineer of the company, but his headquarters will be at Springfield, Mass. Mr. Shepard continuing his headquarters at Boston, where he was located as Assistant Engineer. Mr. Edward A. Haskell has been appointed Roadmaster of the Second Division to succeed to the vacancy caused by the promotion of Mr. Stone. The new Roadmaster has been connected with the Boston & Albany since April, 1887, entering its engineering department that year as surveyor, after graduating from the Massachusetts Institute of Technology.

—The railroad inspectors recently appointed by the Railroad Commissioners of Massachusetts, are Mr. Daniel M. Wheeler, of Rutland, for two years; Mr. Grafton Upton of Worcester, for two years, and Mr. Charles E. Paige of Lowell, for one year. Mr. Wheeler is a civil engineer. He has practiced his profession in Worcester for the past ten years and has had large experience in railroad building, mostly in the west. The second inspector has been superintendent in car shops of the Fitchburg and the Old Colony Roads. Whether his field will include the Grafton & Upton Railroad is not stated. Mr. Paige has seen 25 years' experience in the operating department of railroads, having been Superintendent or General Freight Agent for ten years or more.

ELECTIONS AND APPOINTMENTS.

Atlantic & North Carolina.—At a meeting of the private stockholders of this road, held at Morehead City, N. C., the following directors were elected: John M. Morehead, T. D. Webb, L. H. Cutler, and Dempsey Wood. The road is principally owned by the State of North Carolina, and Governor Carr, of that State, has appointed as directors on the part of the State, the following: W. W. Caraway, Charles Dewey, W. T. Caho, W. L. Kennedy, Samuel W. Latham, and C. E. Foy. A quarterly dividend of 2 per cent. was declared, making 6 per cent. so far for the present year, and it was decided to purchase some additional rolling stock.

Baltimore & Lehigh.—The present officers of this company, recently reorganized, are J. Wilson Brown, President; W. A. Moore, General Manager and Chief Engineer; John K. Shinn, Auditor and General Freight and Passenger Agent; S. R. Shinn, Trainmaster, and W. L. Guyton, Master Mechanic. The general offices of the company are at Baltimore, Md.

Baltimore & Ohio Southern.—J. B. Scott, for twenty-five years local agent at Hillsboro, O., has been appointed traveling passenger agent, with headquarters at Vincennes, Ind.

Cape Fear & Yadkin Valley.—At a meeting of the stockholders of this road, now in the hands of a Receiver, held at Greensboro, N. C., President W. A. Lash and all the old officers were re-elected.

Charleston, Sumter & Northern.—E. M. Averill has been appointed General Freight Agent, with headquarters at Sumter, S. C.

Chesapeake, Ohio & Southwestern.—F. D. Thompson has been appointed General Superintendent, with headquarters at Louisville, Ky.

Chicago Great Western.—W. A. Dolan has been appointed Traveling Passenger Agent for New York, the New England States and Canada, with headquarters in New York City.

Chicago Great Western.—J. Berlinget, in addition to his duties as Assistant General Superintendent, has been appointed Superintendent of Telegraph, to succeed J. C. Ford, with office at St. Paul, Minn. J. C. Ford, formerly Superintendent of Telegraph, has been appointed Superintendent of the Dubuque and St. Paul divisions, with headquarters at Oelwein, Ia.

Chicago, Rock Island & Pacific.—S. C. Matthews has been appointed Auditor of this company, vice F. W. Porter, deceased.

Choctaw, Oklahoma & Gulf.—The Choctaw, Oklahoma & Gulf, which is the title of the new company formed upon the reorganization of the Choctaw Coal & Railway Co., has been organized by the election of Francis I. Gowen, president; George H. Earle, Jr., Samuel Dickson, Effingham B. Morris, Charles Hartshorne, Rollin H. Wilbur, Charles

Biddle, and Allen Reed. The Board of Managers will serve until Jan. 2, 1895, when, under the voting trust provided by the reorganization plan, a new board will be chosen.

Cleveland, Cincinnati, Chicago & St. Louis.—L. L. Hyde has been appointed Freight Claim Agent, with office at Cincinnati, O.

Concord & Montreal.—At the annual meeting of the stockholders, at Concord, N. H., Oct. 9, these directors were elected: Frederick Smyth, of Manchester, N. H.; Benjamin A. Kimball, John H. Pearson, of Concord; Walter M. Parker, of Manchester; John A. White, of Concord; Alpha J. Pillsbury, and Charles H. Tilton, of Tilton; Samuel S. Kimball, of Concord; Charles E. Morrison, of Boston; Lewis C. Pattee, of Enfield; Charles A. Busiel, of Laconia; Noah S. Clark, of Manchester, and Hiram N. Turner, of St. Johnsbury, Vt.

Cumberland Valley.—The following were elected at the annual meeting held in Harrisburg, Pa., Oct. 1: President, Thomas B. Kennedy; Directors, Thomas B. Kennedy, George B. Roberts, J. Herman Bosler, Henry D. Welsh, A. J. Cassatt, H. H. Houston, John Stewart, John P. Green, M. C. Kennedy, Edward B. Watts and Spencer C. Gilbert.

Detroit, Grand Haven & Milwaukee.—The annual meeting was held in Detroit on Oct. 1, and the following directors were elected: L. J. Seargeant and Charles Percy, Montreal; Joseph Hobson, Hamilton; George B. Reeve, Chicago; W. J. Spicer, John Bridgeon, Jr., and James L. Edson, Detroit. James H. Muir was re-elected Secretary and Treasurer.

Dominion Atlantic.—The present officers of the company are as follows: President, F. Tothill, London, Eng.; General Manager, W. R. Campbell; Resident Manager, K. Sutherland; General Passenger Agent, P. Giffkins, and General Freight Agent, John Carroll. The local headquarters are at Yarmouth, N. S. The company is a consolidation of the Yarmouth & Annapolis and Windsor & Annapolis roads.

Dubuque & Sioux City.—The annual meeting was held in Dubuque, Ia., on Oct. 2, and O. P. Tallerton, of Sioux City; Frank D. Stout and James W. Conchar, of Dubuque, were elected directors to succeed John T. Hancock, deceased; E. C. Woodruff, of New Jersey, and A. S. Garrettson, of Sioux City.

Duluth Transfer.—Joseph A. Modica has been elected Secretary to succeed Day K. Smith, deceased.

Fitchburg.—At a meeting of the Governor's Council recently held in Boston, James Renfrew, Jr., of Adams, was elected a director to succeed the late John Quincy Adams.

Fort Worth & Rio Grande.—B. T. Booze has been appointed General Freight and Passenger Agent, with headquarters at Fort Worth, Tex.

Great Northern.—T. F. Corwin has been appointed Superintendent of the Cascade Division, with headquarters at Spokane, Wash.

Kinderhook & Hudson.—C. T. Moffet has been appointed General Passenger and Ticket Agent, to succeed W. H. Fritchman.

Lake Erie & Western.—S. R. Kramer has been appointed Superintendent of the Peoria Division, with office at Lafayette, Ind., to succeed O. E. Grady.

Lake Erie & Western.—At the annual meeting held in Peoria, Ill., on Oct. 3, George F. Baker, Edward Tuck and Nelson Robinson, of New York City, whose terms as directors expired, were re-elected.

Louisville & Nashville.—The annual meeting of the stockholders of the railroad was held at Louisville on Oct. 3, 347,063 out of the 528,000 shares being represented. President Milton Smith retired from the Board of Directors, being succeeded by Albert Pink, of Louisville. All the other Directors were re-elected as follows: August Belmont, New York; H. P. Garth, New York; J. A. Horsey, New York; John L. Helm, Louisville; G. M. Lane, Boston; A. Marcus, New York; W. Merlens, New York; J. D. Probst, New York; Thomas Rutter, New York; Edmund Smith, Philadelphia; J. D. Taggart, Louisville; J. I. Waterbury, New York.

Macon & Northern.—E. T. Horn has been appointed General Manager, with headquarters at Macon, Ga.

Minnesota & Wisconsin.—H. E. Burt has been appointed General Superintendent, to succeed James Menogue, formerly Acting Superintendent.

Minneapolis & St. Louis.—At the annual meeting, held at Minneapolis on October 2, the following directors were elected for three years: August Belmont, Edwin Hawley, and Richard B. Hartshorne. Frederick E. Palmer was elected to fill the unexpired term of W. H. Truesdale, resigned. The election of officers will be held later in the month.

Missouri Pacific.—Martin L. Clardy has been appointed General Solicitor at St. Louis, to succeed H. S. Priest, who recently resigned to accept the appointment of Federal District Judge in Missouri.

New York, New Haven & Hartford.—John Henry, Jr., has been appointed Superintendent of Motive Power of the Old Colony Division, with office at Boston, Mass., to succeed J. N. Lauder, deceased.

Oregon Railway & Navigation Co.—J. Campbell has been appointed General Agent at Portland, Or.

Pennsylvania.—General Superintendent F. L. Sheppard has announced the following appointments: D. M. Watt to be Superintendent of the West Pennsylvania Division, to succeed James Reed, resigned. D. H. Lovell to be Superintendent of the Monongahela Division, to succeed D. M. Watt, transferred. Frank F. Robb to be Superintendent of the Cambria & Clearfield Division, to succeed D. H. Lovell.

Philadelphia, Reading & New England.—J. N. King, formerly Superintendent of the Seneca Division of the Lehigh Valley, has been appointed Superintendent to succeed G. T. Royer, resigned.

Portland & Rochester.—At the annual meeting held in Boston, Mass., Oct. 3, Lucius Tuttle was elected a Director to succeed Frank Jones and Franklin A. Wilson was elected to succeed Arthur Sewall. George P. Wescott was re-elected President and J. W. Perkins Superintendent.

Pullman Palace Car Co.—A. P. Rosenberger has been appointed District Superintendent at Jacksonville, Fla.

San Diego, Cuyamaca & Eastern.—The officers of this company are: Geo. J. Leovy, President; Joseph H. Barbour, Vice-President; Waldo S. Waterman, General Manager, Secretary and Treasurer, and A. J. O'Connor, Auditor. The general offices are at San Diego, Cal.

Seattle, Lake Shore & Eastern.—The office of Car Accountant is abolished, and the car service accounts are transferred to the accounting department, W. J. Jennings, Auditor, Seattle, Wash. Daniel O'Leary has been appointed Master Mechanic, to succeed George Gabriel, assigned to other duties.

Southern.—J. S. Eaton has been appointed traveling auditor, vice W. O. Knight, transferred to the western system.

Southern Pacific.—Holmes Cummings, General Attorney of the Chesapeake, Ohio & Southwestern, has been appointed General Attorney of the Western System of the Southern Pacific, with headquarters at Austin, Tex.

St. Louis Southwestern.—The annual meeting was held in St. Louis, Mo., on Oct. 3. The following directors were elected: S. W. Fordyce, St. Louis; Edwin Gould, Tarrytown, N. Y.; W. B. Doddridge, St. Louis; M. Gernsheim, R. M. Galloway, Thomas T. Eckert, New York; Robert Moore, A. L. Wolff, St. Louis, and Winslow S. Pierce, New York.

Texas Mexican.—C. W. Fish has been appointed General Freight and Passenger Agent, to succeed W. B. Ryan, resigned.

Valley (O.).—J. P. Leingang has been appointed General Freight and Passenger Agent to succeed J. B. Caven, deceased.

Vicksburg, Shreveport & Pacific.—The annual meeting of the company, one of the lines of the Queen & Crescent system, was held at Monroe, La., on Monday, Oct. 1, and the old Board of Directors was re-elected. The Board consists of Messrs. C. C. Harvey, Charles Schiff, Edward R. Bacon, Frank S. Bond, D. Graff, Isaac P. Martin, F. L. Maxwell, and George C. Waddill.

RAILROAD CONSTRUCTION. Incorporations, Surveys, etc.

Arizona & Southeastern.—The extension north from Fairbank, the former terminus of the railroad, north to Benson, Ariz., was completed last week. This gives the company a connection with the Southern Pacific, and makes the line about 50 miles long.

Atlantic Short Line.—Mr. John R. Young, of Savannah, Ga., who is now at the head of this company, which has taken over the property of the Macon & Atlantic Railroad, has arranged to finish and put in operation 30 miles of the road graded by that company in 1891. This work was done by the Macon Improvement Co., which built the Georgia Southern & Florida Railroad, and was forced into bankruptcy shortly after the work east of Macon was undertaken. The work now to be done is near Macon, Ga. About 12 miles of track has already been laid on this section, and the grade is said to be in fair condition. The total distance from Macon to Savannah by this line is about 165 miles, and of this something less than two-thirds has been graded.

Baltimore & Ohio.—Some active work is being done in maintenance of way improvements on the Pittsburgh Division. The rails now in the track on about 40 miles between Pittsburgh and Connellsville, Pa., mostly 60-lb. sections, will be replaced by the 75-lb. section proposed by the committee of the American Society of Civil Engineers. About 2,000 tons of the new rail section have been delivered along the line. A six-bolt angle plate is being used with the new rail. The work undertaken between these towns will cost about \$110,000. The improvements will include the building of several iron bridges, one with 60 ft. girder spans at Soho and a four track iron bridge at Turtle Creek, which together will probably bring the cost of the work up to \$150,000.

Butte, Anaconda & Pacific.—Toole & Twohy have commenced grading west of Anaconda, Mont., on the extension to the Bitter Root. The surface work will be pushed until the cold weather sets in, when the rock work will be started and continued all winter, with the intention of having everything ready for the tracklayers early next season.

Charlevoix & Frederic.—David Ward, of Detroit, Mich., the large timber land owner, is building a railroad from Frederic on the Mackinaw division of the Michigan Central to Charlevoix on Lake Michigan. Over 14 miles of track have been built northwestward from Frederic and the bridge across the Manistee River, a span of 83 ft., has just been finished by the Detroit Bridge & Iron Works. The grading is nearly finished to Charlevoix.

Chester & Greenville.—Application will be made to the General Assembly of South Carolina at its next session for a charter incorporating this company, which proposes to build a railroad from Chester, S. C., to Greenville, S. C., about 70 miles.

Chester & Lenoir.—This is one of the Carolina properties formerly operated by the Richmond & Danville, excluded from the reorganization plan. It has been operated by the stockholders for about a year and many reports have been published as to its possible extension. The last story is based on a visit of the President, G. W. F. Hopper, to the coal fields in the western part of Virginia. The scheme discussed is an extension of the railroad, which is now operated from Chester, S. C., to Lenoir, N. C., 110 miles, from the latter point to Cranberry, a distance of 60 miles. This would give valuable connections with the Western North Carolina and the South Atlantic & Ohio and other roads reaching the coal fields in Virginia.

Cleveland, Wooster & Muskingum Valley.—The officers of the Baltimore & Ohio, which operates this railroad, have recently awarded a contract to M. J. Degnon, of Cleveland, for the track-laying on this road south of Wooster to Millersburg, O., the distance being about 19 miles. This is the only new work which the Baltimore & Ohio contemplates undertaking this year.

Florence Northern.—Neely, Smith & Co., of Chattanooga, Tenn., the contractors who did considerable work on this railroad north of Florence, Ala., in 1891, purchased the property at the sale at Memphis, Tenn., on October 2, the purchase price being \$25,000, about the amount of their claim. The railroad has been graded from Florence about 30 miles toward Linden, Tenn.

Florida Southern.—Several miles of road have now been graded on the extension south of Micanopy to Williston, Fla. The entire line will be 14 miles long, and is being built under the direction of C. R. Knight, of Jacksonville, Fla., Chief Engineer of the Jacksonville, Tampa & Key West Railroad.

Genesee & Wyoming Valley.—This road, which is the property of the Retsof Mining Co., and at present connects the Western New York & Pennsylvania with the Lackawanna at Griggsville, N. Y., is to be extended to Caledonia, where a junction will be made with the New York Central, the Buffalo, Rochester & Pittsburgh, the Lehigh Valley, and the Erie. The extension will be about 14 miles long.

Hot Springs.—This railroad extending from Malvern to Hot Springs, Ark., 22 miles, is reported to have been purchased by President Milair, of the Southwestern Pacific Co., which was organized a few years ago to carry on railroad construction in several of the Western States,

but which up to the present time has not done much in that line. The property purchased is a valuable and paying one. It was owned for many years by the late J. N. Reynolds of Chicago, who was popularly known as Diamond Joe. The railroad runs along the gorge of the Washita River from the Ozark Mountains to Hot Springs.

Kansas City, Shreveport & Gulf.—The officers of the Kansas City, Pittsburg & Gulf have recently secured a State charter in Louisiana. This action is taken in anticipation of the proposed extension of the railroad to Shreveport, La. The southern terminus of the line is now at Texarkana, this being the old Texarkana & Fort Smith Railroad. The company has yet to build, however, over 100 miles of the railroad through Arkansas to connect the latter road with its main line, which has been built only about 25 miles south of the state line. W. S. Taylor has been elected President and F. B. Hubbell, Secretary. These are officers of the Kansas City, Pittsburg & Gulf and E. L. Martin, of Kansas City, A. E. Stillwell, of Philadelphia, and other directors of that company are incorporators of the new line. G. S. Bruce is the engineer. The western officers of the Kansas City, Pittsburg & Gulf road have recently been through Louisiana and visited Texarkana, Shreveport and the other towns on the proposed railroad to secure right-of-way and the promise of local assistance from the towns. The company has secured an act of Congress granting authority to bridge certain rivers in Arkansas and Louisiana.

Morrill, Antigo & East.—Articles of Association were filed in the Secretary of State's office in Madison, Wis., last week by this railroad company. It proposes to construct a road from Prentice, Price County, southeast 70 miles, through Lincoln and Langlade Counties to Antigo. Capital \$1,000,000. Organizers, L. F. Buckman, L. N. Anson, A. H. Strange, T. S. Heinemann and B. Heinemann.

New Roads.—Application will be made to the next General Assembly of South Carolina, for a charter to build a railroad from Piedmont, in Greenville County, S. C., to Abbeville, C. H., by way of Pelzer, Williams- ton and Belton in Anderson County. Among those interested are: J. C. Klugh, W. C. McGowan, W. A. Templeton, J. A. Anderson, A. M. Erwin, J. E. Wakefield, and R. B. Robinson.

Major Samuel Walton, of Roanoke, has been awarded the contract to construct eleven miles of railroad to connect the Norfolk & Western at Curve, Giles Co., Va., with the Mountain Lake iron and timber lands purchased by a Northern syndicate, represented by S. S. Chisholm and C. B. Houghton at Roanoke.

The Beauce Railroad, from King Junction, Que., into the interior of Beauce County, was opened for traffic Oct. 4. Several Quebec ministers were present, and Sir Adolphe Caron, Postmaster-General, represented the Dominion Government.

Paducah, Harrisburg & Chicago.—This company filed a charter in Illinois to build a road in Southern Illinois. The proposed road is to start at Shelbyville and terminate at Metropolis, running through the counties of Effingham, Clay, Wayne, Hamilton, Saline, Pope and Richland. The capital stock is \$3,000,000, and the general offices will be at Chicago. The incorporators are Simon S. Barger, of Eddyville; James H. Hildreth, W. H. Ruger, James L. Campbell, and Allen T. Young, of Chicago, and John W. Mitchell.

Rumford Falls & Rangeley Lakes.—Ward Brothers, of Kennebunk, Me., have received the contract for building the first 18 miles of this railroad east of Rumford Falls, Me. The contract for the masonry of the bridge at Rumford Falls was let in August to Eli Roy, of Lewiston, Me. This section of the railroad extends up the valley of the Swift River, passing Swain and Reed's Mills, to the town of Byron. The total length of the railroad is to be 28 miles, extending beyond Byron down the Bemis stream to the Rangeley Lakes. Besides this there will be about 15 miles of branches. The work is light and the construction will be fairly easy. It is expected that the road will be completed to Houghton, the first town beyond Byron, by August of next year. The line will reach a great timber district and the projectors of the railroad propose to build several saw mills along its line. The principal bridge work will be the structure at Rumford Falls, and two other iron bridges about 100 ft. and 350 ft. long. Two long trestles are to be built, one 400 ft. long and 300 ft. high, and the other 200 ft. long and 20 ft. high.

Saluda Valley.—Application will be made to the next session of the General Assembly of South Carolina for a charter to build a railroad from Greenwood, S. C., by way of Cokesbury, Pelzer and Piedmont, to Greenville or Easley, S. C. Among the incorporators are: J. C. Maxwell, T. F. Riley, J. K. Durst and J. S. Bailey.

San Francisco, Stockton & San Joaquin.—The Traffic Association of San Francisco has announced its plan for the organization of a company to build a railroad through the San Joaquin Valley in California. Manager Leeds states that an effort will now be made to secure subscriptions of \$350,000 to the company's stock.

Spokane & Northwestern.—The charter for this company with a capital of \$50,000 was filed in Washington in September by A. E. Lasher, C. S. Wynn and M. F. Mendenhall. The road to be built is a short branch, from the Seattle, Lake Shore & Eastern Railroad at Spokane, Wash., to a smelter. The line is now being built.

Streets Run & Dravosburg.—This company was incorporated in Harrisburg on October 5 to build a railroad from Hays Station in Baldwin Township, south through Baldwin and Mifflin Townships, then east to the village of Dravosburg. The distance is four miles, all in Allegheny County. George W. Williams, of Pittsburg, is President. The Directors are: James P. Wilson, of Pittsburg; Homer H. Swaney, of McKeesport, and A. R. Macall, of East Liverpool, O.

Summit Mineral.—Work is reported to have commenced on this road, which is to reach many of the mines in the Rimini district, southwest of Helena, Mont. It will be narrow gage, 18 miles in length, from the mining town of Rimini to the Ontario mine concentrator in Deer Lodge County.

GENERAL RAILROAD NEWS.

Alabama Great Southern.—The annual meeting of the stockholders of the Alabama Great Southern Railway, Limited, was held in Birmingham, Ala., last week. As we have noted in these columns this railroad is involved in a contest between the directors of the Cincinnati, Hamilton & Dayton, and the minority bondholders of the Cincinnati extension bonds issued by the East Tennessee, Virginia & Georgia. The American directors of the English Company, at the recent stockholders' meeting in London, were supplanted by representatives of the Cincinnati, Hamilton & Dayton, who secured a controlling interest through the purchase of a majority of the

bonds from Baron Erlanger. This party at Birmingham attempted to substitute new directors for those now on the board representing the minority interest. Though they control a majority of the stock the attempt was unsuccessful, the minority interests having secured an injunction preventing the counting of votes cast for the representatives nominated by the Cincinnati, Hamilton & Dayton people, on the ground that they were not stockholders of record as required by the Alabama law. The present Board of Directors now hold over until the sale of the property, when it is expected that other lines between the present system will be purchased in the interest of the Southern Company, who have made an agreement with minority representatives to change their present bonds for securities of the new Southern Railway Co.

Atchison, Topeka & Santa Fe.—The directors state that proxies for about 290,000 shares have already been received by the Proxy Committee of the Board, to be voted at the annual meeting on October 25. This does not include the 80,000 shares owned in Holland, which will be voted for the present Board. The largest vote cast in any election heretofore was about 700,000 shares.

Atchison, Topeka & Santa Fe.—In the following table the earnings and expenses of this system are given for the month of August, 1894, and for two months of the fiscal year, with comparisons with the same period of 1893:

ATCHISON, TOPEKA & SANTA FE SYSTEM PROPER.				
Month of August.	1894.	1893.	Inc. or Dec.	
Average oper. mileage..	6,695	6,719	D	24
Gross earn.....	\$2,463,365	\$2,795,393	D	\$332,028
Oper. expen.....	1,945,649	1,795,646	I	150,003
Net earn.....	\$517,716	\$999,747	D	\$482,031
ST. LOUIS & SAN FRANCISCO.				
Average oper. mileage..	1,328	1,328		
Gross earn.....	\$596,627	\$531,328	I	\$65,299
Net earn.....	\$284,629	\$209,164	I	\$75,465
AGGREGATED SYSTEM.				
Average oper. mileage	9,321	9,344	D	23
Gross earn.....	\$3,466,740	\$3,663,872	D	\$197,132
Oper. expen.....	2,610,894	2,430,855	D	180,039
Net.....	\$855,846	\$1,233,017	D	\$377,171
ATCHISON, TOPEKA & SANTA FE SYSTEM PROPER.				
July 1 to August 31.				
Gross earn.....	\$4,084,649	\$5,559,447	D	\$1,474,798
Oper. expen.....	3,575,263	3,697,719	D	122,456
Net earn.....	\$509,386	\$1,861,728	D	\$1,352,342
ST. LOUIS & SAN FRANCISCO.				
Gross earn.....	\$1,037,069	\$1,112,875	D	\$75,806
Net earn.....	\$464,052	\$447,333	I	\$16,719
AGGREGATED SYSTEM.				
Gross earn.....	\$5,862,691	\$7,391,544	D	\$1,528,853
Oper. expen.....	4,789,382	5,028,865	D	239,483
Net earn.....	1,073,309	\$2,362,679	D	\$1,289,370

Atlanta & Florida.—E. C. Spaulding, of Atlanta, has been appointed temporary Receiver of the railroad from Atlanta to Port Valley, Ga., 100 miles. The suit under which this order was made is filed in the Georgia Superior Court by the Atlantic Trust Co., which has made advances amounting to over \$28,000 to the company. It is claimed that the road is in bad financial condition and only able to operate its road for some months past through loans from trust companies and others. The Central Trust Co., of New York, recently filed a mortgage for \$112,000 to cover over \$100,000 advanced for the purchase of the property early in the year. The road was placed in the hands of a receiver in 1892, and was sold at foreclosure a few months ago for \$500,000, \$100,000 being paid in cash which, as stated above, was obtained from the Central Trust Co., the balance, \$400,000 being in the company's bonds.

Baltimore & Lehigh.—The Pennsylvania section, with its rights and franchises and the interests of the Baltimore Forwarding & Railroad Co. in the property, was sold at York, Pa., last week to satisfy a claim for \$2,500. The road was purchased by W. T. Walworth, of Cleveland. This sale clears the property of the litigation in which it has been involved since it went into the hands of a receiver about two years ago. The road will be reorganized and operated under new management. The Maryland section had been previously sold. The Pennsylvania division extends from York to Delta, 41 miles.

Bangor & Aroostook.—The report to the Maine Railroad Commissioners for the year ended June 30, 1894, gives the following results: Earnings, \$245,903; expenses, \$187,612; net earnings, \$58,299. The deficit for the year, after paying interest, charges, etc., and rental for other roads, \$63,950, is \$43,357. The total deficit June 30 was \$33,146. There was expended for maintenance of way and structures, \$79,419; maintenance of equipment, \$16,224, conducting transportation, \$70,320.

Canadian Pacific.—Some time ago the Canadian Pacific notified the Quebec Provincial Government that it intended to pay off the \$7,000,000 balance due to the Province on account of the sale of the North Shore and Quebec, Montreal & Western Railway. Their amount bears interest at the rate of five per cent., and brings into the Provincial Treasury \$350,000 a year. The company later intimated to the Government that it desired to withdraw the notice for the time being, and at a provincial cabinet meeting at Quebec the withdrawal was agreed to.

Delaware River & Lancaster.—The French Creek branch of this railroad from French Creek Falls to the junction near Phoenixville, Pa., 13 miles long, has been leased by L. E. Butman, of New York, and train service was resumed this week. It has been idle for ten months after being operated for some time by the company owning it, and then by the Wilmington & Northern Company, who could not make it pay. The line will have its chief traffic from the granite quarries near French Creek Falls and points along the route.

Grand Rapids & Indiana.—Default was made last week on the first mortgage seven per cent. bonds of the railroad. The interest due is from April 1 to Oct. 1 on the \$1,441,000 of bonds not endorsed by the Pennsylvania Co. The latter company guarantees the interest on \$3,934,000 of the bonds. The holders of the defaulted bonds can have them taken up at 110 and interest out of the sinking fund, or by relinquishing the land grant clause can have them indorsed by the Pennsylvania Co.

Macon & Northern.—The Railroad, which was sold by order of Judge Speer, at Macon, Ga., on October 3, was purchased by Mr. Alexander Brown of Baltimore, for the bondholders. The minimum price fixed by the court for the property was \$1,000,000, and this was the price at which it was bid in by Mr. Brown.

Montreal, Portland & Boston.—The company is endeavoring to obtain from the Dominion Government a subsidy for that part of the road from Farnham, Que., to the boundary line, a distance of 21 miles. This part of the road has not been operated for some years. The company has now an opportunity to lease it to the Central Vermont, which will operate it provided it is put in good repair. The road has been subsidized by the Quebec Government and the municipalities through which it passes, but has not received any grant from the Dominion Government. Messrs. Baker, M. P., and Spencer, M. P., have therefore gone to Ottawa to apply for the usual Dominion subsidy of \$3,200 per mile. The premier has given his promise that the application should receive consideration.

Northern Pacific.—Judge Jenkins, at Chicago, has authorized the issuance of \$5,000,000 worth of receivers' certificates, by the sale of which the immediate debts of the road can be paid. On account of the opposition of the second and third bondholders to the issuance of the certificates, the court placed a restraint on the actions of the receivers by ordering that they report to him on Oct. 22 what bids shall have been by that time received and at what interest, so that he may decide whether it will be proper to accept them.

Northwestern Elevated (Chicago).—A first mortgage was filed for record last week at Chicago to the Illinois Trust & Savings Bank, trustees, the amount being \$15,000,000. The principal is due August 1, 1944. The mortgage is signed for the Northwestern Elevated Railroad Co., by D. H. Louderbach as President, and Howard Abel, Secretary for the railroad company.

Ohio Southern.—At a meeting of the stockholders of this company held on Saturday last, the directors were authorized to lease or purchase the Columbus, Lima & Milwaukee Railroad Company's property, consisting of 40 miles of graded right-of-way from Lima, O. to Defiance, O. It was also decided to continue the main line from Jeffersonville, O., to Columbus, a distance of 40 miles.

Southern Railroad Co.—The general meeting of the stockholders at Richmond, Va., last week, gave the officers authority to execute a mortgage to the Central Trust Co., of New York, as trustee, to secure an issue of bonds for \$120,000,000, payable June 1, 1904. It also authorized the execution and delivery of a mortgage upon parts of the railroad and properties of the former East Tennessee, Virginia & Georgia Railroad, to secure bonds for the principal sum of \$4,500,000 payable Sept. 1, 1938, bearing five per cent. interest. Of the \$120,000,000 issue of first consolidated five, \$78,088,372 will be reserved to take up the outstanding mortgage and equipment obligations; \$21,911,627, including \$6,000,000 for new construction, will be used now, and \$20,000,000 will be reserved for new construction after January, 1896, but not more than \$3,000,000 will be issued during any one year.

TRAFFIC.

Traffic Notes.

The Missouri, Kansas & Texas is shipping cotton from Waco, pressed in cylindrical bales by a new press which is said to be very powerful. One car load is said to have contained 110 bales, weighing 490 pounds each.

The Delaware, Lackawanna & Western, running Pullman cars, and the New York, Chicago & St. Louis, running Wagner cars, have arranged for through sleeping-car service between New York and Chicago, the cars of the two companies alternating.

The Pennsylvania has shortened the time of its fast train between Cincinnati and New York to compete with the recent increase in speed over the Big Four and the New York Central. Pennsylvania Train No. 20 now leaves Cincinnati at 4.30 p. m., and runs through to New York in 21 hours.

The Minneapolis, St. Paul & Sault Ste Marie has notified the Railroad Commissioners of North Dakota that it will make its tariffs of freight rates, on coal mined within the State, conform to the reduced schedules recently issued by the Commissioners. The Northern Pacific and the Great Northern have refused to use these rates, and the Board will further consider the subject this week.

The number of passengers carried in the cars of the New York & Brooklyn Bridge Railroad during September was 3,407,362, an increase of 128,741 over the same month of 1893. The receipts, however, were \$3,069 less, in consequence of a reduction in fare.

The through passenger traffic between New York and Boston in September was 12 per cent. greater than for the same month last year.

The new Minnesota and Dakota Car Service Association extends over Minnesota and both Dakotas, and absorbs both the Terminal Dispatch Association and the Lake Superior Car Service Association. The charges for detaining loaded cars after the first 48 hours will be \$1 per car for the first day, and \$2 per car for the second and each succeeding day.

Chicago Traffic Matters.

CHICAGO, Oct. 10, 1894.

All-rail traffic eastbound, showed a slight increase last week over the preceding week and nearly equaled the tonnage for the corresponding week in 1893. Lake shipments were spasmodic in spite of the collapse of the vesselmen's combination to maintain the Lake Superior coal rate.

It is now generally admitted that there are serious irregularities in eastbound freight rates, especially on export grain, and there will be a meeting at Cleveland October 23 to see what can be done.

A movement has been inaugurated looking to the placing of all trans-continental traffic in the hands of either an executive board composed of presidents and vice-presidents, or in the hands of some experienced traffic official as commissioner, following in some particulars the plan recently adopted by the southwestern lines. It is said that the passenger traffic will also include that portion of the haul between Chicago and the Missouri River now controlled by the Western Passenger Association. The recent conference held here, although a failure as regards resurrecting the old association, had the result of bringing about a "showing of hands," and the further result of a determination on the part of some of the roads to endeavor to formulate a satisfactory plan for controlling the business, with the above result. It is by no means certain that the accomplishment of the plan can be secured as it depends largely on a settlement of the existing differences between the Atchison and the Southern Pacific.

As the result of recent meetings held in this city the Western Freight Association lines have been able to arrive at a better understanding regarding rates to the northwest, and have agreed that established rates on all traffic to trans-Mississippi River territory, Missouri River

points, St. Paul, Minnesota Transfer, Minneapolis and dependent territory, including La Crosse and Winona, shall be strictly maintained on and after Oct. 10.

Some of the Chicago journals are making a great ado over the discovery that the Chicago Great Western has withdrawn from the agreement of the western lines not to pay over five mills a mile on cars of private ownership, by giving notice of a resumption of the old rate of 7½ mills on tank cars. As a matter of fact the notice of the Chicago Great Western (which was given on Sept. 29) has not as yet caused any break in the agreement and there are good reasons for the belief that it will fail of its evident intent—to break down the agreement. It is generally assumed that this action on the part of this line is at the command of the Union Tank Line Company. Conferences with other lines, not now members, and with the eastern lines are soon to be held, at which it is expected the agreement will be materially strengthened by the co-operation of a number of additional lines.

Chairman Midgley of the Western Freight Association, who has been active in organizing the machinery of the new association of western presidents, has been made commissioner in charge of the operation of the agreement under the control of the Executive Committee. He will continue his connection with the other association, the two associations co-operating. The new organization is styled "The Executive Committee of the Western and South-Western Railroads."

Messrs. Eustis, Heafford and Buchanan, sitting as arbitrators, have decided upon a readjustment of the differentials to be allowed the Lake Shore and the Pittsburg & Lake Erie, the Panhandle and the Baltimore & Ohio on passenger business between Chicago and Pittsburg, allowing the two former a differential of \$1.50 first-class and \$1 second-class, and the Baltimore & Ohio \$1 first-class and 50 cents second-class. Heretofore the Lake Shore line has had \$1 on both first and second classes, the Baltimore & Ohio \$1.50 on first class, and \$1 on second and the Panhandle no differential at all.

Roads west of the Missouri River will advance all freight rates to Portland, Oregon, from 7 to 25 per cent. on October 20.

Some of the daily papers profess to have discovered that eastbound rates via St. Louis and lower Mississippi River junctions are being secretly cut from 25 to 40 per cent. Prominent traffic officials here discredit these stories and say that there is no more cutting going on now than there always is, with the exception of the open cut of the Alton on export grain, via New Orleans, to meet the action of the Memphis line via New Orleans.

The Chicago & Alton and the Kansas division of the Union Pacific have adopted a new time table, shortening the time between Chicago and Denver some four hours.

The Wabash, the Iron Mountain, the Texas & Pacific, and the Southern Pacific will inaugurate a tourist sleeping car line between Chicago and Los Angeles, Nov. 1.

The Chicago & Eastern Illinois Railroad, and the Indiana block coal operators have made an agreement to share equally the profits on all coal sold in the Chicago market.

A meeting of the Advisory Board of the Western Passenger Association was held October 8, for the consideration of a number of pending matters, the two more important being the suggestion of the Trunk Lines that their agents at Ellis Island be allowed to control the routing of immigrant business on the agreed divisions of the Clearing House, and the attitude of the Canadian Pacific. The action of the Trunk Lines, taken at their meeting last week, came in the nature of a surprise to the western lines, and practically amounts to a request for the withdrawal of the agent of the western roads. The members of the board express themselves as wholly at a loss to account for the position of the eastern lines in the matter and seem to think that they should have been invited to a conference before the passage of any formal resolution. The position of the Canadian Pacific is apparently a peculiar one. While professing to co-operate with the western lines in the payment of commissions, it takes the position that it should be allowed to continue its individual deals with the agents of the association. This right being disputed by the other lines, it is apparently endeavoring to attract business by the tender of commissions in excess of the agreed scale both to the immigrant agents and to the steamship agents. So far the other roads have acted on the defensive, but unless a better state of affairs prevails soon they are likely to assume the offensive in this matter. The arrangement, as a whole, however, is reported as working satisfactorily. No conclusions were reached at the meeting and a conference with eastern lines will be held in New York October 16.

The Interstate Commerce Commission is after the Atchison for facts concerning some of the rebates disclosed by expert Stephen Little. The case was brought to the attention of the Federal Grand Jury here, and subpoenas were issued for Receiver Walker and General Auditor Gillett, commanding them to produce a certain receipt given by Isaac Thompson, dated Oct. 14, 1892, for \$890 for a rebate on 173 carloads of live stock shipped in 1892 from Kansas City to Chicago; also a receipt signed by G. H. Hammond & Co., for a rebate of \$2,980 on 596 carloads of stock shipped during the months of April, May, June, July, August and September, 1892, from Kansas City to Hammond, Ind., together with all the books and papers and printed tariffs connected with these shipments.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending Oct. 6, amounted to 54,000 tons, against 53,852 tons during the preceding week, an increase of 148 tons, and against 55,663 tons for the corresponding week last year. The proportions carried by each road were:

ROADS.	WEEK TO OCT. 6.		WEEK TO SEPT. 29.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central.....	3,806	7.1	3,834	7.1
Wabash.....	7,815	14.5	6,475	12.0
Lake Shore & Mich. South..	5,200	9.6	6,126	11.4
Pitts., Ft. Wayne & Chicago.	5,524	10.2	5,323	10.0
Pitts., Cin., Chi. & St. Louis	7,383	13.7	7,250	13.4
Baltimore & Ohio.....	4,136	7.6	3,347	6.2
Chicago & Grand Trunk.....	6,086	11.3	6,702	12.4
New York, Chic. & St. Louis	5,491	10.1	5,857	10.9
Chicago & Erie.....	5,063	9.4	6,235	11.6
C., C. C. & St. Louis.....	3,496	6.5	2,703	5.0
Totals.....	54,000	100.0	53,852	100.0

Of the above shipments 1,876 tons were flour, 21,793 tons grain and mill stuff, 8,329 tons cured meats, 11,699 tons dressed beef, 1,460 tons butter, 1,784 tons hides, and 4,148 tons lumber. The three Vanderbilt lines carried 26.8 per cent., the two Pennsylvania lines 23.9 per cent. Lake lines carried 74,223 tons against 54,682 tons last week.